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SHOP PRACTICE

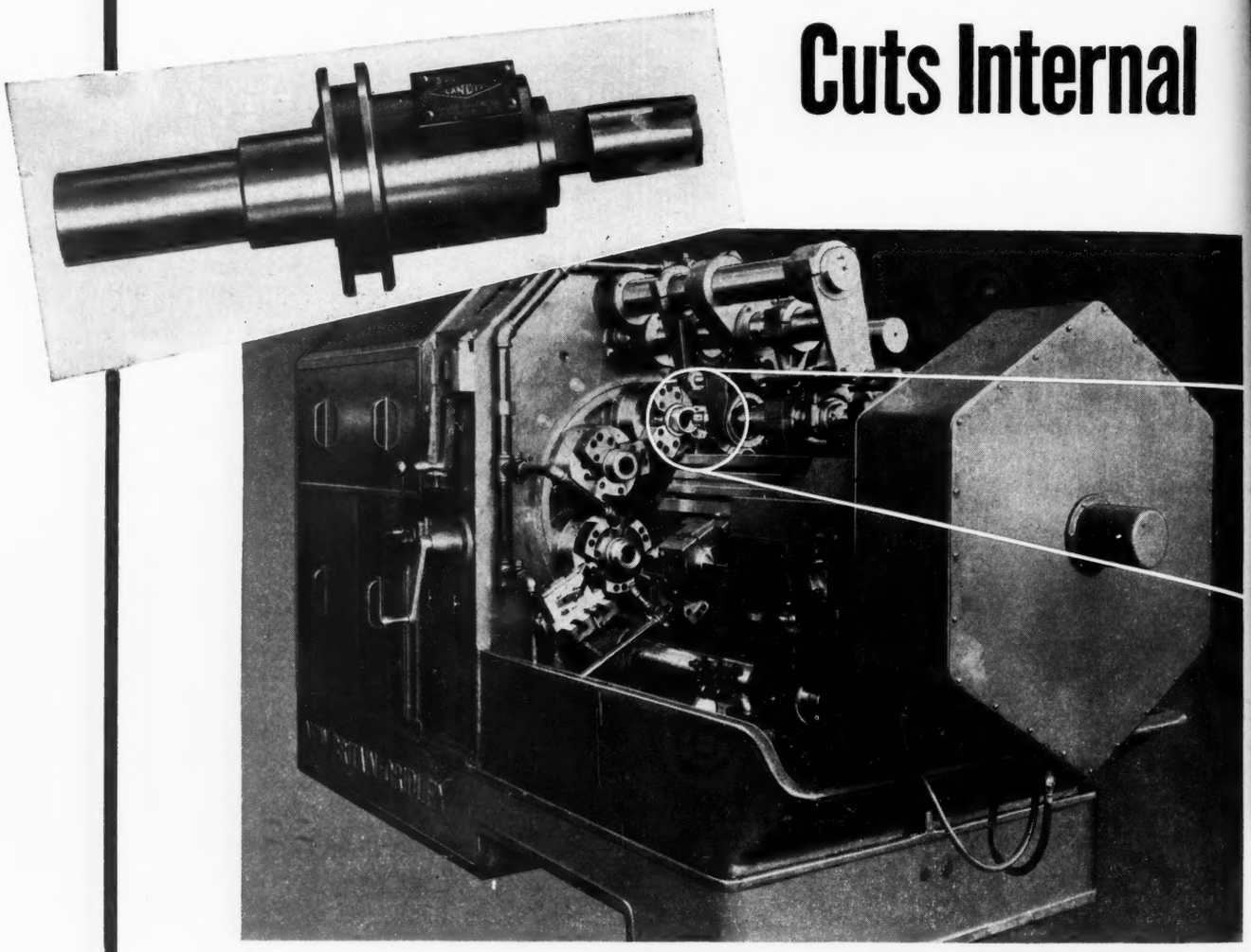
MACHINE AND TOOL DESIGN

MANAGEMENT PROBLEMS

DEPARTMENTS

AN IMPROVED

Cuts Internal



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THE WORLD'S LARGEST MANUFACTURER OF

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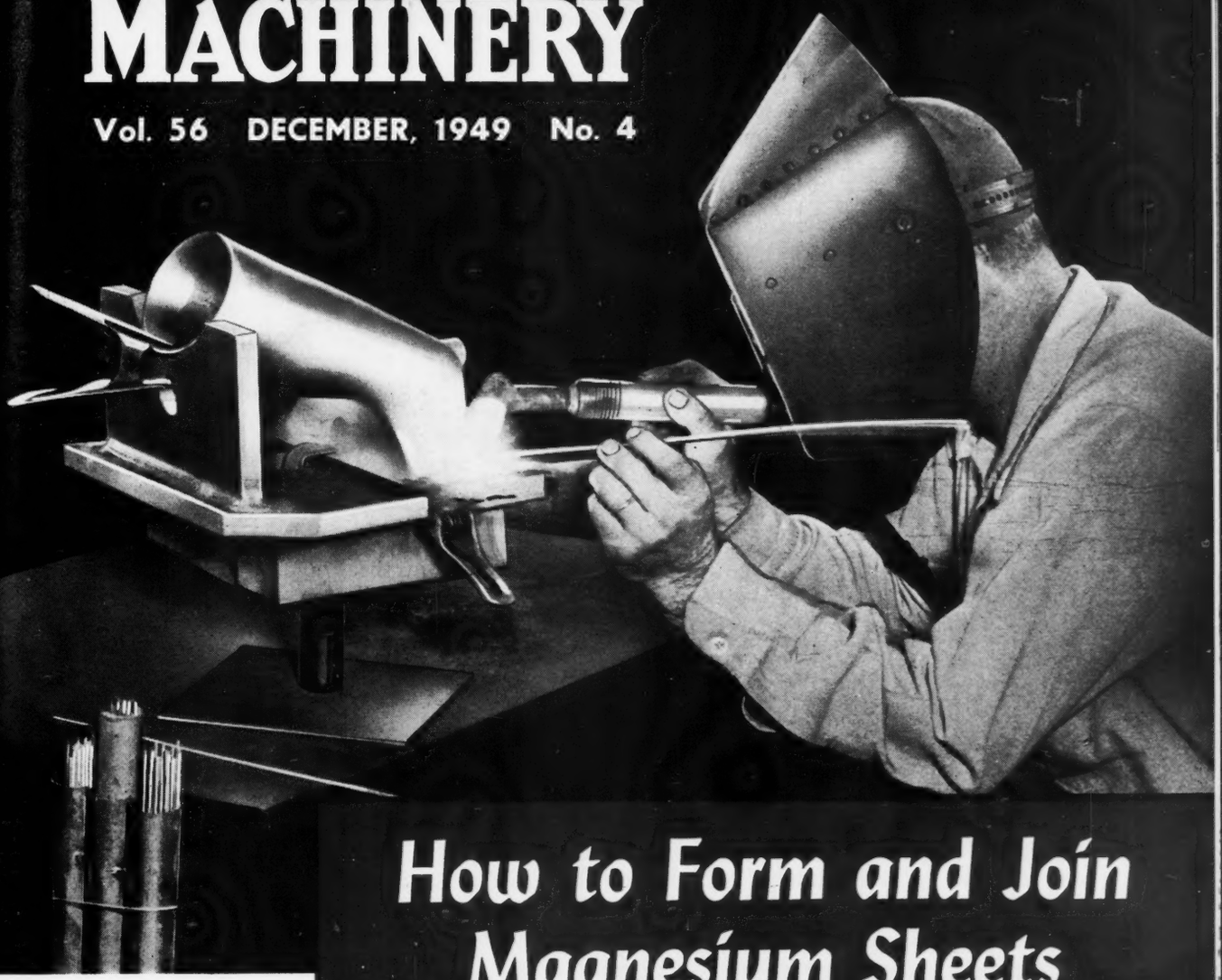


How to Form and Join Magnesium Sheets

By C. L. HIBERT, Process Engineer
Consolidated Vultee Aircraft Corporation
San Diego, Calif.

DESIGNERS in the aircraft industry have always searched for means of reducing weight. Certain parts best suit the purpose for which they are intended when made from material of relatively heavy gage and light weight. However, if the selection of a magnesium alloy for a part is based on its physical properties alone, many disappointments result. There are other important considerations besides weight in aircraft design, as, for example, noise and vibration. Because of the low modulus of elasticity of magnesium alloys, they have a greater capacity for elastic shock absorption, and therefore vibration is reduced.

The composition and physical properties of magnesium alloys available in sheet form are given in Table 1. The Consolidated Vultee Aircraft Corporation has restricted its use of magnesium sheet to one alloy, namely, Dow FS–1h. Experience gained in the fabrication of this alloy is described in the following.

Although it is possible to form magnesium parts on drop-hammers, this method is not recommended because of the necessity of heating the massive die normally encountered in drop-hammer work, and also because of the high speed of impact. Magnesium normally requires form dies for best results. On a double-acting press, it is much easier to control magnesium forming.

Wrought alloys of magnesium cannot be tempered by heat-treatment, and, at first thought, it might be assumed that this is an undesirable characteristic. On the contrary, from the shop standpoint, this is a very desirable characteristic, as it eliminates an operation commonly required in working aluminum alloys. Since

Table 1. Composition and Physical Properties of Magnesium Sheet Alloys

Alloy Designations			Nominal Composition (Remainder Magnesium)			Ultimate Tensile Strength, 1000 Pounds per Square Inch		Yield Strength (Tension), 1000 Pounds per Square Inch		Per Cent Elongation in 2 Inches	
ASTM	Dow Chemical	Army and Navy Spec.	Aluminum	Zinc	Manganese	Typical	Min.	Typical	Min.	Typical	Min.
M1	Ma	AN-M-30	...	...	1.5	33	28	15	12	17	12
	Mh		...	...	...	37	32	29	22	8	4
AZ31X	FS-1a	AN-M-29	3.0	1.0	0.3	37	32	22	15	21	12
	FS-1h		...	...	...	43	38	33	29	11	4

heat-treating is not feasible, hand rework is not usually necessary on parts formed from magnesium alloy. Such parts may be formed without severe distortion at elevated temperatures. Since the advent of 75S aluminum alloys, equipment and means have been developed to use hot-forming in place of heat-treating. Consequently, industry is better equipped for the use of magnesium alloys.

Standard presses can be used for forming magnesium, but the die and blank must be heated to obtain efficient production and prevent cracking of the part. It is not necessary to heat the blank when the magnesium sheet is less than 0.040 inch thick, but the dies must be heated.

In deep-drawing, high initial pressure is required to start the plastic flow of the material. After the inertia has been overcome, considerably less pressure is needed to form the part. The press capacity required for deep-drawing of magnesium is generally less than for comparable parts made from aluminum alloy.

Generous fillets and corner radii should be specified for drawn magnesium parts. Minimum bend radii for various magnesium alloys are given in Table 2. If the part is drawn in two operations, it is recommended that it be annealed at a temperature of from 640 to 650 degrees F. between operations for the following periods of time:

Blank Thickness, Inch	Heating Time, Minutes Min.	Max.
0 to 0.062	15	120
0.063 to 0.187	20	120
0.188 to 0.250	30	120
0.251 to 0.500	45	120

With magnesium alloys it is possible to obtain approximately a 50 per cent reduction in diameter in one operation, and a total of 75 per cent reduction in two drawing operations.

For high-production drawing of magnesium, the punch should be water-cooled to prevent shearing the bottom of the cupped part. If the part tears along its top edge in a geometric pattern, this indicates that the magnesium-alloy blank is too cold. If the part fails near the bottom of its sides, it is being formed too hot. When

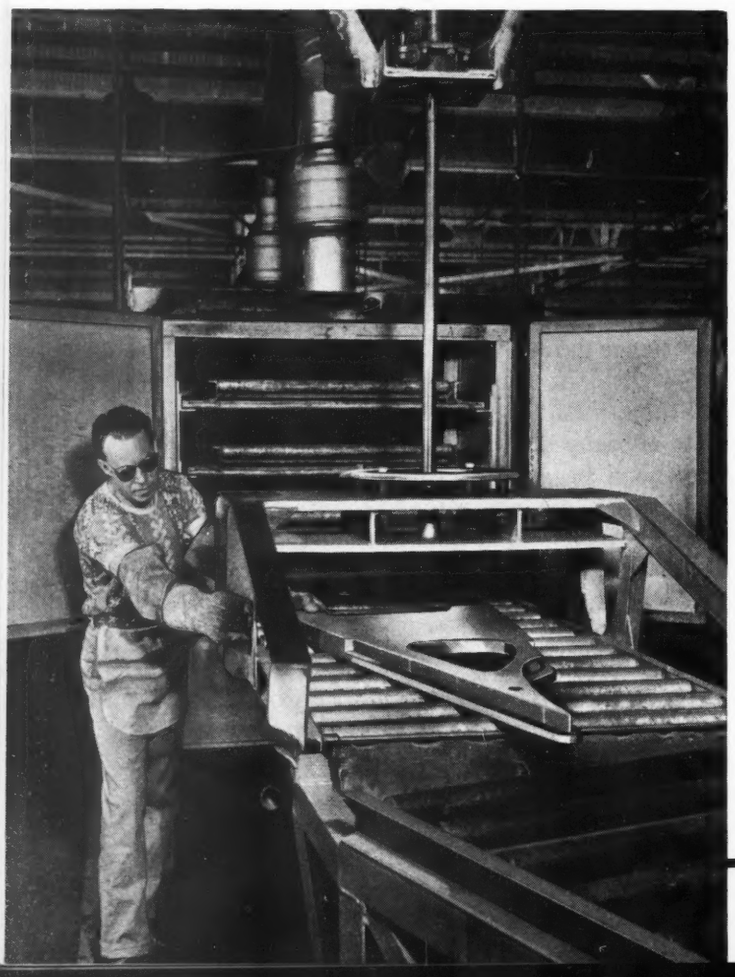


Fig. 1. Kirksite dies employed for forming magnesium sheet on a hydraulic press are heated in an oven

Fig. 2. Hot-bending of magnesium sheet is accomplished on a press brake by providing gas burners on the bed and ram of the machine

the material is 0.040 inch thick or less and the blank is not heated before drawing, a fifteen-second dwell of the press ram is employed to permit the cold blank to reach the desired temperature. When heated blanks are employed, a dwell is not required. Ordinarily, with sheet thicknesses greater than 0.040 inch, die temperature is tested at regular intervals by means of a contact type pyrometer.

Hot-bending of magnesium sheets on a press brake is accomplished by means of the set-up seen in Fig. 2. It will be noted that there are gas pipes containing burners along their axis on the bed and ram of the press brake. The pipes can be swung out of the die heating position, as shown, during the bending operation. Resistance heating is also employed in forming magnesium, as shown in Fig. 3. Here a magnesium-alloy angle is being heated prior to a joggling operation.

Recommended maximum temperatures for hot-forming sheets of four different magnesium alloys are as follows:

Dow Alloy	Max. Temp. of Tools and Sheets, Degrees F.
Ma	650
Mh	400
FS–1a	550
FS–1h	300

Lower temperatures can be used when smaller per cent reductions in diameter are specified. In forming magnesium sheets on hydraulic presses, using heat-resistant rubber pads, temperatures should not exceed 400 degrees F. The effect of

Table 2. Minimum Bend Radii (Inch) Recommended for Drawn Shapes of Magnesium Alloys

Blank Thickness, Inch	Magnesium Alloy							
	Army-Navy Spec. AN-M-30, Condition A (Dow Ma)		Army-Navy Spec. AN-M-30, Condition H (Dow Mh)		Army-Navy Spec. AN-M-29, Condition A (Dow FS-1a)		Army-Navy Spec. AN-M-29, Condition H (Dow FS-1h)	
	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot
0.016	0.16	0.06	0.25	0.06	0.09	0.03	0.19	0.06
0.020	0.19	0.06	0.31	0.09	0.09	0.06	0.19	0.09
0.025	0.19	0.09	0.38	0.12	0.12	0.06	0.25	0.12
0.032	0.22	0.09	0.50	0.19	0.16	0.06	0.31	0.12
0.040	0.25	0.12	0.62	0.25	0.19	0.09	0.38	0.22
0.051	0.31	0.16	0.75	0.31	0.25	0.09	0.50	0.25
0.064	0.38	0.19	0.88	0.38	0.31	0.12	0.62	0.38
0.072	0.44	0.22	1.25	0.50	0.38	0.16	0.81	0.44
0.081	0.50	0.25	1.25	0.56	0.44	0.19	0.81	0.44

Note: Bend radii specified above are not applicable to roll-formed sections, since smaller radii can be used on such shapes.

forming temperature on the comparative yield strength of magnesium alloy FS–1h hard-rolled sheet and two other alloys is shown in Fig. 4.

Riveting Magnesium Alloys

In riveting magnesium alloys, 56S aluminum-alloy rivets are commonly employed because of the good corrosion-resistant properties of this alloy when used in conjunction with magnesium. If magnesium parts must be joined to parts of dissimilar metals, it is absolutely essential that the parts be electrically insulated from each other. The insulation should extend beyond the edges of the joint, as it is there that the corrosion is most pronounced.

In riveting aluminum and magnesium parts together, it is common practice to apply two coats of zinc-chromate primer to both the aluminum and the magnesium. It is much better, however, to avoid any type of design that uses another metal in conjunction with magnesium. Countersinking of magnesium sheets for riveting is not advisable, due to the tendency toward fatigue cracking. Therefore, either protruding head rivets are used or hot dimpling is employed for countersunk rivets.

Usually, when bolting magnesium parts together, the bolts or fastening mechanism are dipped in zinc-chromate primer. Magnesium alloys can be joined by applying thermosetting plastic cement to the adjoining surfaces of the assembly and curing under pressure and heat. Two common processes for accomplishing this are "Cycle Weld" and "Metlbond."

Methods Used in Welding Magnesium Alloys

The equipment normally used for aluminum alloys may be utilized for the resistance welding of magnesium alloys. Magnesium alloys have a higher resistance than aluminum alloys, and consequently do not require as high an electrical setting on the welding machine. Pressures and tip contours employed are similar.

Spot- and seam-welding of magnesium present no particular problem to anyone engaged in similar operations on aluminum alloys. The only difference in procedure is the cleaning and etching. If the sheets when received have previously been subjected to the Type I chromium-pickle treatment, it is necessary to remove the film produced by this treatment with a 15 to 20 per cent caustic soda solution. The operating temperature of the solution should be from 150 to 180 degrees F., and the parts should be immersed for a period of from four to eight minutes. They are then rinsed in water at room temperature, and air dried.

Oiled sheets are pre-cleaned by using cleaning compounds usually employed for aluminum alloys, such as Oakite No. 61 or No. 63. The deoxidizing or etching treatment after pre-cleaning is accomplished by immersing the parts in the following solution, maintained at room temperature, for a period of from two to five minutes: Chromic acid, 18 to 22 per cent; sulphuric acid, 0.03 to 0.07 per cent. Following etching, the parts are rinsed in warm water to facilitate drying and prevent oxidation.

Tanks for the etching solution may be lined with 2S or 52S aluminum alloys, which is welded with a rod of the same analysis. Any dissimilar metals dropped into the tank will result in an elec-

Fig. 3. A magnesium-alloy angle is being brought up to forming temperature by resistance heating in preparation for joggling

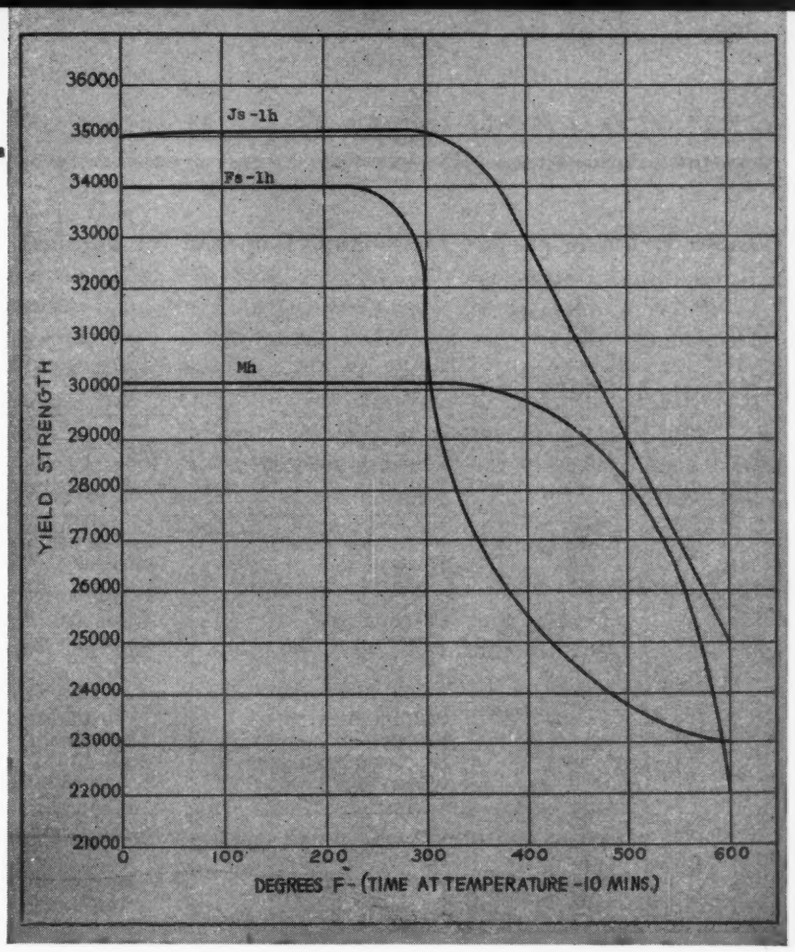


Fig. 4. Effect of forming temperature on the comparative yield strength of three hard-rolled sheet magnesium alloys

trolysis of the aluminum alloy, causing a hole to form in the tank in a short time. Cleaning of the work with stainless-steel wire brushes is sometimes substituted for chemical cleaning, but this method does not lend itself to a production process.

For the fusion welding of magnesium alloys, oxy-acetylene gas-welding or inert-gas arc-welding can be used. If oxy-acetylene torch welding is utilized, it is necessary to neutralize the weld flux within one or two hours after welding. Two solutions are available for this treatment—chromium nitrate or citric acid. The chromium-nitrate neutralizing solution for flux-welded magnesium-alloy parts contains 20 per cent chromic acid and 2 per cent calcium nitrate. The solution is maintained at a temperature of between 130 and 160 degrees F., and the parts are immersed for from one to five minutes. The citric-acid solution contains 1 per cent citric acid, and is operated at room temperature. Parts are immersed in this bath for ten to fifteen minutes.

If the magnesium sheets are of sufficient thickness (0.040 inch or more), inert-gas arc-welding should be used. For this type of welding (see heading illustration), alternating-current machines equipped with high-frequency power are desirable. Either argon or helium can be used for inert-gas arc-welding. At present, argon gas is preferred because of its heavier density and greater cooling capacity. In order to weld magnesium alloys successfully, it is necessary that proper jigs and fixtures be available.

Owing to the relatively high coefficient of thermal expansion of magnesium, elimination of warpage is one of the greatest problems confronted in arc-welding this metal. Warpage is particularly pronounced on thinner sheets. Consequently, all parts should be held in suitable jigs and securely clamped prior to welding.

Jigs and clamping plates are generally made of steel in order to give rigidity and strength to the assembly, which must resist forces set up during heating and cooling of the metal. Clamping plates should come within 1/2 or 3/4 inch of the weld to prevent the metal from bending in the heat-affected area. It is good practice to keep the clamps from extending above the jigs, so that access to the weld zone with the torch and filler rod will not be difficult.

The jig and backing plate should fit the contour of the sheet accurately, in order to hold the plate tightly all along the weld area. This precaution tends to reduce warpage, and will also hold the parts in alignment. Toggle clamps for holding the jig to the plate should be spaced from 4 to 10 inches apart, and should be equipped with clamp bars of steel to eliminate open space between the clamps.

Backing plates of copper can be incorporated in the jig to advantage. Fitting of abutting joints is not so critical and there is less chance of warpage and misalignment of the welded part if a backing-plate type jig is used. The backing plate is grooved beneath the area to be welded to permit penetration of the weld metal.

A successful way of minimizing warpage in single-pass butt welds is by using the tapered-gap method. This consists of securely fastening each sheet in a movable jig in such a way

Table 3. Chemicals and Compounds Required for Protective Treatment of Magnesium Alloys

	Bath	Compounds	Concentration	Temperature
1	Caustic Cleaner	Oakite No. 90	8 to 10 ounces per gallon of water	190 degrees F.
2	Nitric-Sulphuric Pickle	Nitric Acid Sulphuric Acid Water	8 parts by volume 2 parts by volume 90 parts by volume	Room temp.
3	Hydrofluoric Pickle	Hydrofluoric Acid Water	15 to 20 per cent by weight Remainder	Room temp.
4	Chromic Acid Pickle	Chromic Acid Water	1.5 pounds Enough to make 1 gallon	Room temp.
5	Chrome Pickle Type I	Sodium Dichromate Nitric Acid Magnesium Sulphate Water	0.75 to 1.5 pounds 0.7 to 1.5 pints 0.2 pound Enough to make 1 gallon	Room temp.
6	Sodium Dichromate Type III	Sodium Dichromate Water Chromic Acid	0.75 to 1.5 pounds per gallon 10 to 20 per cent by weight As required to maintain pH limits of 4.2 to 5.5	212 degrees F.

Note: In Bath No. 5 the use of magnesium sulphate is optional.

that the edges to be welded are close together along one side of the sheets and separated at the opposite side. A gap having a taper of about 1/8 inch per foot should be provided between the edges of the sheets to be welded. As welding progresses from the closed end, the shrinkage forces pull the sheets, and the jigs to which they are clamped, together, resulting in a weld that has practically no warpage.

Butt or tee welds in magnesium should have as close a fit as possible for consistently strong joints and even penetration of the weld metal. A gap between abutting sheets of as little as 1/16 inch on 1/8-inch thick plates will usually cause excessive penetration, which not only wastes metal, but also decreases the possibility of a sound joint. A draft through the gap, set up by hot air currents from the arc, makes the inert-gas shroud less effective, and results in oxidation and a poor weld.

For thin sheets, it is recommended that abutting edges be parallel and perpendicular to the surface of the sheet. Variations at the root of the abutting edges will result in unequal penetration of the weld metal and excessive warpage.

In butt-welding magnesium sheets of greater thickness than 5/32 inch, the abutting edges should normally be "veed" to give an included angle of from 90 to 120 degrees. A flat surface 1/16 inch wide should be left at the root of the vee for abutting the sheets.

It is recommended that double-vee joints be made on combinations of magnesium sheets more than 1/4 inch thick. In making a double-vee joint, less warpage will occur if the top vee extends about two-thirds through the metal. The amount of welding required on the back of the sheet will then be just about sufficient to pull the parts back in line. Before making the under side of the weld, it is generally necessary to rout away part of the first weld, so as to remove inclusions.

Temperatures employed for stress-relieving welded magnesium sheets vary from 265 to 285 degrees F. for FS–1 alloy, and from 380 to 400 degrees F. for M alloy.

Protective Treatments for Magnesium Sheets

For purposes of increasing the corrosion resistance of magnesium sheets and producing a suitable surface for paint, several treatments may be used. Type I—chrome-pickle treatment—is suitable for protecting sheets during shipment, or in temporary storage; for bonding; and for touching up previously treated work. This treatment is applicable to all alloys when close dimensional tolerances are not required. Type II—sealed chrome-pickle treatment—provides a

paint base and long-time protection of all alloys when close dimensional tolerances are not required. Type III—dichromate treatment—provides a paint base and gives extended protection to the FS–1 alloy only. Type IV—galvanic anodizing treatment—is an electrolytic process similar to anodizing for aluminum alloys.

The San Diego Division of the company has requested sellers of magnesium-alloy sheets to supply the sheets in an untreated oiled condition. There are several reasons for this; one is that the Type I treatment given sheet alloys, which is a temporary protection during shipment, has to be removed prior to processing, such as welding. Also, in the case of resistance welding, the pickle treatment given to the sheet when the Type I treatment is applied affects the surface of the alloy, and the etching procedure prior to spot-welding is not as effective. Consequently, bare sheet is a requirement for spot-welding if it is intended to use the chemical etchant for surface preparation. Normally Type I treatment is applied only to magnesium sheets that are to be touched up, and for protection of interior areas not exposed to a corrosive medium.

Pickling Baths Employed

Prior to processing with the Type I or Type III corrosion protection treatment, parts are pickled by either the nitric-sulphuric, hydrofluoric, or chromic-acid pickle, as outlined in Table 3. The nitric-sulphuric pickle can be used to remove surface oxidation and corrosion products, sand, or the effects of blasting, and for the general cleaning of all rough, unmachined parts or castings. It is not suitable for use on parts having close tolerances, inasmuch as considerable metal is removed. This pickle is not applied to parts previously chemically treated by the supplier, if the treatment is still intact.

The hydrofluoric pickle can be used for removing sand or the effects of blasting on all parts, and its use is mandatory for close-tolerance parts and those which have been sand-blasted. It is not satisfactory for removing surface oxidation and products of corrosion. This pickle is the one employed by the company for sheet alloys.

Since brass, bronze, cadmium, and steel are unaffected by the hydrofluoric acid solution, magnesium-alloy parts containing studs, bushings, or inserts of these metals may receive this treatment. Aluminum, however, is rapidly attacked by this acid, and, therefore, parts containing aluminum-alloy inserts should not be subjected to the hydrofluoric pickle, but should be brushed with the chrome-pickle solution.

The chromic-acid pickle can be used for removing surface oxidation and products of corrosion, and for the general cleaning of all parts. It is mandatory for removing surface oxidation and corrosion products on close-tolerance work that requires pickling. This pickle is not suitable for removing sand and effects of blasting.

Methods of Applying Protective Treatment

Methods other than immersion can be used to expose the parts to the solution. The solution can be brushed on or circulated through the interior of tubular structures or tanks for the purpose of removing corrosion products and pickling. Parts are exposed to the acid for a period varying from five to fifteen minutes at room temperature.

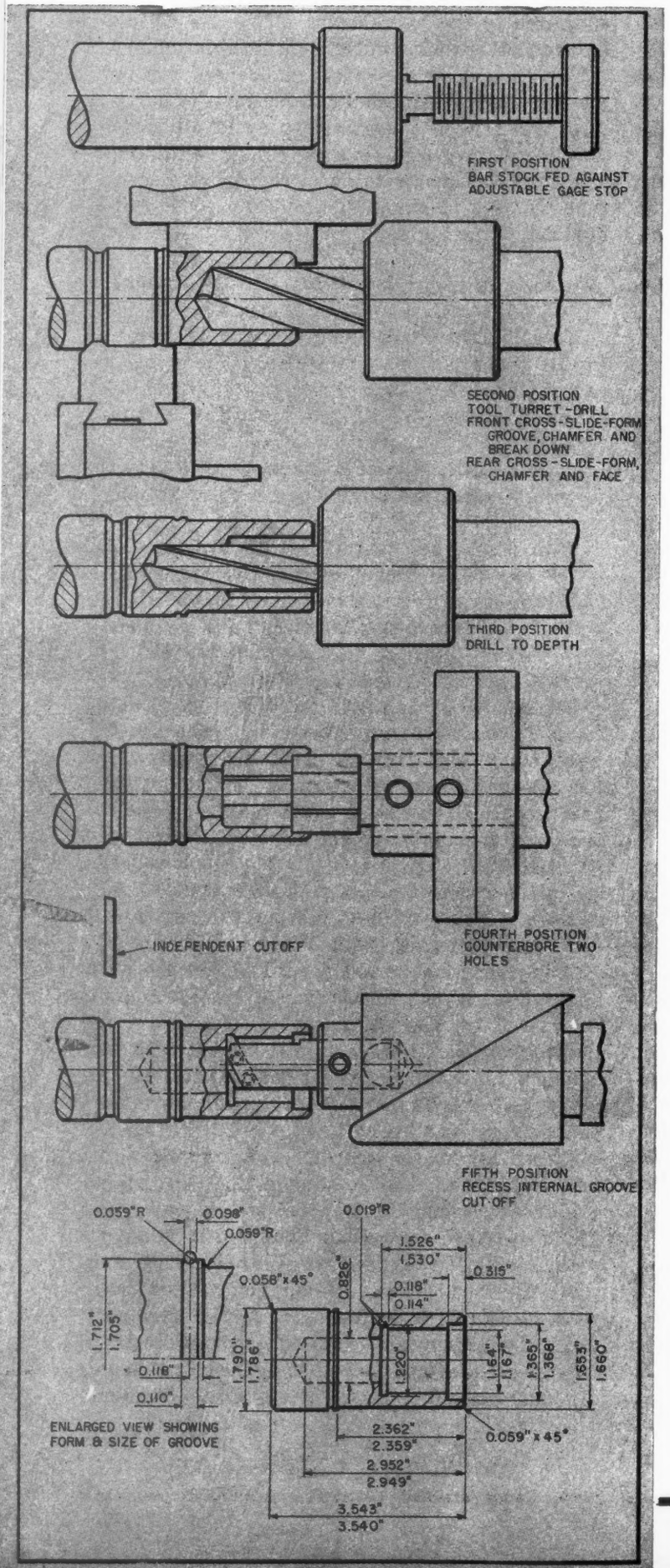
With assemblies containing different metals, which cannot be conveniently immersed in the bath, the Type I treatment can be applied by brushing on generous quantities of freshly made chrome-pickle solution for one minute. Welded areas should be brushed for three minutes.

All exposed areas of magnesium must have a complete, unbroken protective film when finally installed. Following the protective treatment, the parts are rinsed with water. Parts that have been given a protective treatment should receive the required number of coats of primer as soon as possible after drying.

The application of Type I treatment to internal areas not exposed to a corrosive medium is necessary because of the difficulty encountered in using the hot solutions needed for the Type II and III methods. Parts such as tanks, tubes, etc., are filled with the solution. If the part is difficult to drain, the solution is diluted with an equal part of water. The treatment should be applied for a sufficient time to produce an effective coating on all areas.

Closed structures are drilled to permit flow and drainage of the diluted solution. The parts are filled with the chromic-acid pickling solution and drained for approximately three minutes prior to the chrome pickle. Welded structures given the chemically neutralizing chrome-nitrate treatment prior to the Type I treatment need not be pickled in chromic acid. After the protective treatments, the parts are given two coats of zinc-chromate primer and two of aluminum lacquer.

Convertibility of Automatics Small-Lot



SMALL shops and other industrial plants producing small lots must keep the number of idle machines at a minimum to permit economical operation. Multiple-purpose machines with means for rapidly changing the set-up for different types of work are important contributions to such economy. An example of such a machine is the new Dialmatic single-spindle automatic made by the Cleveland Automatic Machine Co., Cincinnati, Ohio, which can easily and quickly be converted from a bar to a chucking machine. One automatic is thus adaptable to a wide variety of work.

Typical of the parts produced from bar stock on this type machine is the one shown at the bottom of Fig. 1. S A E 1315 cold-rolled steel 1.850 inches in diameter, is employed in making this part. Stock is fed through the spindle in the conventional manner, as seen in Fig. 2. A feed-shell, attached to the feed-tube, is used to grip the stock. The length of stock fed, which is indicated on a scale bar, can be varied by means of a hand-crank. Removal of the feed-tube and the cartridge in which the tube is mounted is accomplished by releasing a latch. Feed-fingers can then be changed to accommodate a different size bar, or the machine can be converted to chucking work if desired.

The tooling employed to produce the part is shown diagrammatically in Fig. 1 and in the close-up view, Fig. 3. A five-hole turret is provided on the single-spindle automatic for end-working operations, and front and rear cross-slides for turning and forming operations. Cross-slide feeds are controlled by cams mounted on adjustable drums, permitting set-ups and adjustments for various jobs without the need of special cams. Separate, infinitely adjustable feeds can be pre-selected for both

Fig. 1. Tooling employed on the five-hole turret and front and rear cross-slides of a single-spindle automatic screw machine to produce the part shown in the bottom view

Facilitates Production

forward and return motions of each of the five turret positions by means of an electric feed drive.

At the first position, the bar stock is fed against an adjustable gage-stop, which is set for the desired feeding length, as seen at the top in Fig. 1. When the tool turret has been indexed to the second position, the turret is fed laterally by a cam at the rate of 0.008 inch per revolution to drill a hole 1.125 inches in diameter by 1.540 inches deep in the bar stock. Simultaneously, a cutter mounted on the front cross-slide forms a 1.770-inch diameter, a groove, and a chamfer and breaks down the end of the part for subsequent cutting off. Also, a cutter on the rear cross-slide forms a 1.660-inch diameter and a chamfer, and faces one end of the part. During these operations, the work is automatically rotated at a pre-set speed of 257 R.P.M.

At the third position of the tool turret, the spindle speed is automatically increased to 306 R.P.M., and a high-speed steel drill 0.826 inch in diameter is fed at the rate of 0.007 inch per revolution to the required depth. The operations performed at the fourth position, using the same spindle speed, consist of counterboring the two holes previously drilled to a diameter of 1.180 and 1.375 inches with a stepped two-fluted counterboring tool which is fed at the rate of 0.009 inch per revolution.

Finally, a recessing tool-holder and bumper bracket holding a recessing bar and high-speed steel tool bit is employed at the fifth position to cut an internal groove in the part to a diameter of 1.220 inches. The tapered block holding the recessing tool slides along a tapered surface on a mating tapered block when a roll follower contacts the bumper cam mounted on the front cross-slide, thus feeding the recessing tool into the bore of the part.

A cam-actuated independent cut-off attachment, with holder and blade, is mounted on the headstock to cut off the part at this position. The cut-off blade is fed at the rate of 0.0025 inch per revolution and the same spindle speed—306 R.P.M.—is employed as for the two preceding turret positions. With this set-up, a production of sixteen parts per hour is obtained.

To convert the bar machine to a chucking machine requires only the removal of the independent cut-off attachment, chuck, chuck-ring, hood, and feed-tube assembly. The latch construction that holds this assembly makes removal simple and fast. An air cylinder with pull-rod,

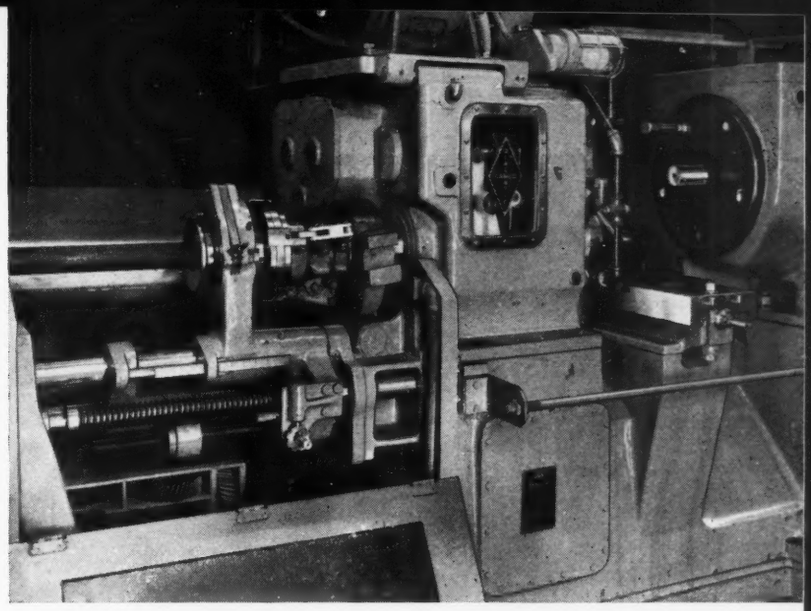


Fig. 2. Close-up view of the bar-stock feeding mechanism on a single-spindle automatic. Length of stock fed can be varied by means of a hand-crank

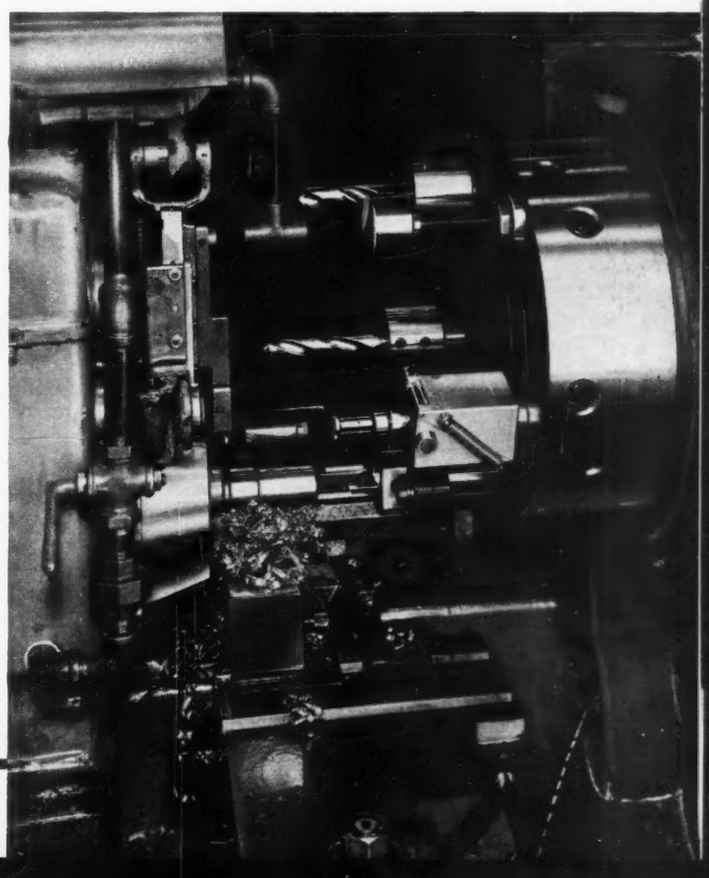


Fig. 3. Set-up employed to produce part shown in Fig. 1 at the rate of sixteen per hour. A cam-actuated independent cut-off attachment is used to cut the finished part from the bar stock

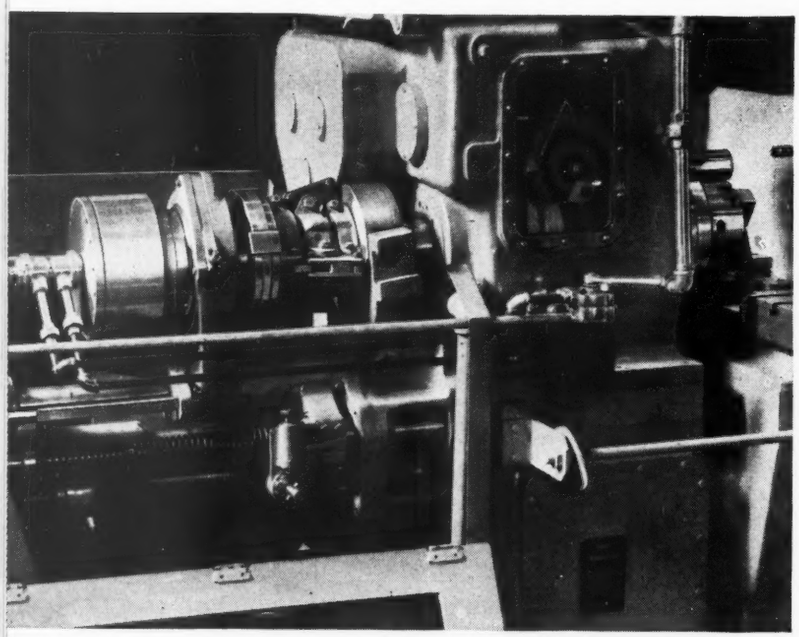


Fig. 4. An air cylinder with pull-rod, oil-seal, chuck adapter, and an air-operated chuck are substituted for the bar-stock feed parts in converting the machine to chucking work

oil-seal, chuck adapter, and an air-operated chuck are mounted in the spindle of the machine in place of the bar-stock feed parts (see Fig. 4). Such change-overs can be made in thirty minutes.

A bronze pump valve seat machined with the automatic equipped as a chucking machine is seen in Fig. 5. The part is held in a three-jaw chuck as shown in Fig. 6. At the first position of the tool turret, the side of the part is center-drilled. The casting is rotated at 1050 R.P.M., providing a surface speed of 860 feet per minute on the 3 1/8-inch diameter of the casting. A hole 33/64 inch in diameter by 3/16 inch deep is drilled at the second position.

At position No. 3, a hole 29/64 inch in diameter is drilled through the center of the casting. Simultaneously, tungsten-carbide tipped tools mounted on the front and rear slides form the outer periphery and face the front of the part, respectively. The drills mounted in the first three positions of the turret are fed at the rate of 0.020 inch per revolution, while the carbide tools on the slides are fed at 0.0045 inch per revolution.

The fourth position on the tool turret is open. At the fifth position, the bore of the casting is threaded, employing a high-speed steel tap, 1/2 inch diameter, having 20 threads per inch. For this operation, the spindle speed is automatically

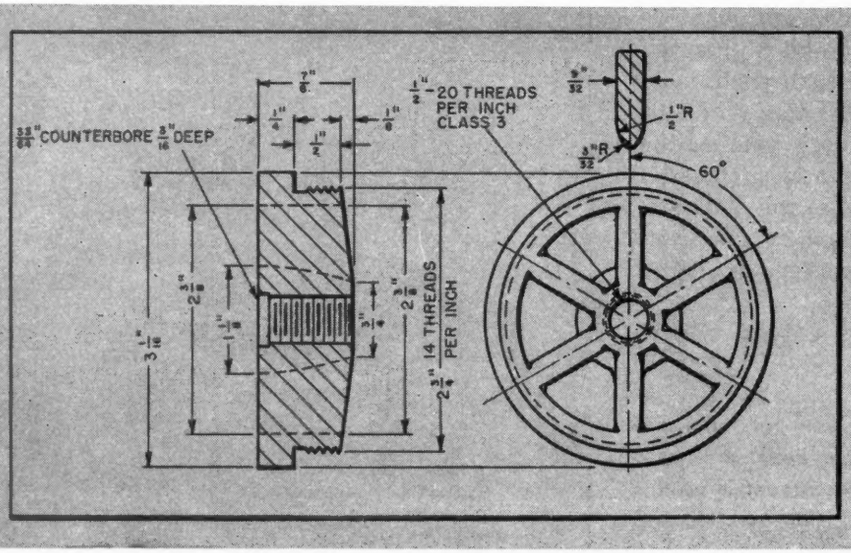


Fig. 5. Cast-bronze pump valve seat produced at rate of seventy-six per hour on an automatic screw machine converted to chucking work

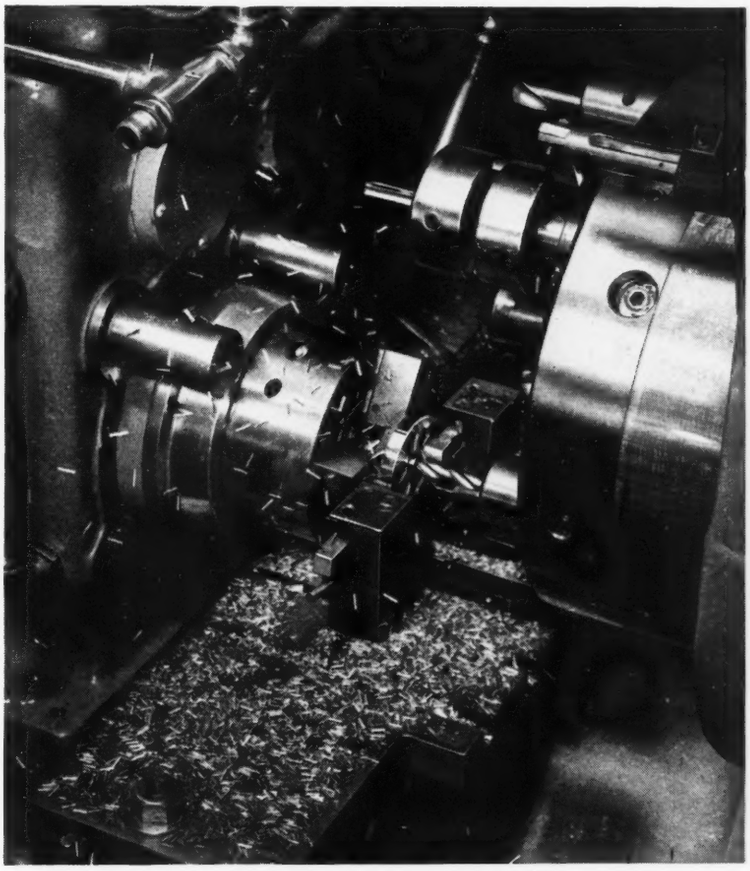


Fig. 6. Tooling for machining the pump valve seat illustrated in Fig. 5. Carbide-tipped forming and facing tools are employed on the front and rear cross-slides

reduced to 336 R.P.M. At the completion of the tapping operation, the spindle rotation is automatically stopped by means of a limit switch on the camshaft of the machine. The production rate on this job is seventy-six valve seats per hour, about eight seconds being required for loading and unloading by hand.

Equipped as a chucking machine, the automatic can be provided with either a hand- or an automatically-operated air valve for controlling the chuck. If the shape of the part permits automatic loading, a chute type magazine can be provided. When this is not possible, one of the turret positions can be equipped with a work-holder and the turret used for loading the part into the chuck. This facilitates hand loading, since the holder in the turret can be loaded during the cutting cycle.

Geiger Counter Adapted for Analyzing Steel

The Geiger counter, used to detect uranium and other radioactive materials and to aid nuclear physicists in atom-smashing developments, is now being adapted for use in the steel industry. Scientists of the Research Laboratory, United States Steel Corporation of Delaware, are using the Geiger counter to analyze steel samples, the method being both quick and accurate. Any steel part with a flat surface can be analyzed.

The method is best adapted to detect and measure elements of middle atomic weight, such as chromium, manganese, molybdenum, titanium, copper, tungsten, and vanadium. While the use of the counter promises to be advantageous in the laboratory, where many determinations of chemical content are necessary, it is expected to be even more valuable in steel operations where it is necessary for the operator of a steel-making furnace to determine quickly, at various steps of the heating cycle, whether he is getting the exact steel composition required.

Packard's Ultramatic Drive

Second and Concluding Installment of an Article Describing Manufacturing Processes Developed for

By E. G. PATZKOWSKY
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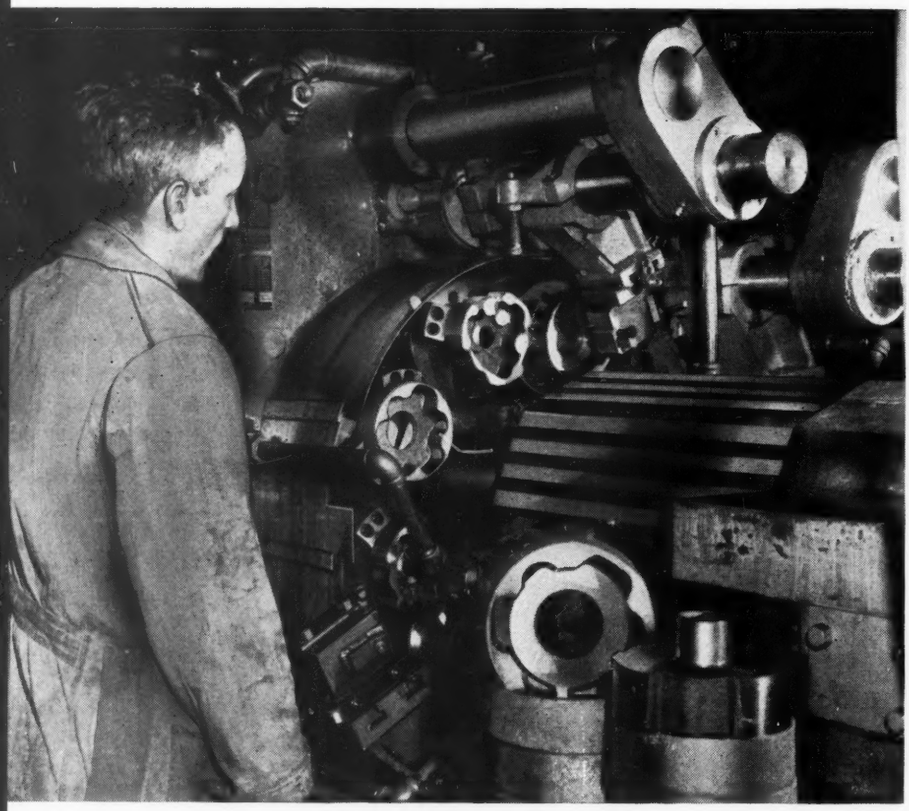


Fig. 12. Both front and rear halves of the transmission planetary cages are rough- and finish-bored and faced on an eight-spindle chucking machine

Fig. 13. Induction heating set-up for silver-soldering rear planetary cages to transmission output shafts (left), and cylinder sleeves to the bores of transmission clutch housings (right)

DETAILS of some of the manufacturing processes employed in building the precision Ultramatic drive unit were described in the first installment of this article, published in November, 1949, MACHINERY, page 170. Additional processes and machines developed to produce close-tolerance parts for this ingenious drive will be described in the present article.

Rear halves of the cages that carry the planetary transmission pinions are rough- and finish-bored and faced on the New Britain eight-spindle, double indexing chucking machine seen in Fig. 12. The front halves of the transmission planetary cages are machined in the same set-up on alternate spindles of the machine.

For these operations, the castings are located by the previously turned diameters and finished rear faces in three-jaw hydraulic chucks. The rear cages are chucked at the eighth station of the machine, and indexed to station No. 2. Here three bores in the part are roughed by means of a three-diameter counterbore mounted on the tool-slide, and the joint face of the cage is roughed by a carbide-tipped facing tool on the front cross-slide. The three bores are finished at the fourth station by three single-point, carbide-tipped tools held in a tool-block sus-

Built by Precision Methods

Building the Precision Ultramatic Drive Units Economically on a High-Production Basis

pended from an overhead boring-bar. At the sixth station, the joint face is finished and the smallest bore—1.406 inches in diameter—is reamed. Similar operations are performed at the alternate stations on the front cages.

Stock removal averages about 3/16 inch from each surface. A work-speed of 200 R.P.M. (370 surface feet per minute on the maximum diameter of the part) is employed, and the tools are cam-fed 0.015 inch per revolution. A total production of 114 parts (57 of both front and rear cages) is obtained per hour.

The rear planetary cages are securely silver-soldered to the transmission output shafts by means of the equipment shown in Fig. 13. This consists of a two-station, motor-generator type induction heater made by the Ohio Crankshaft Co. The splined cages are soldered to the splined shafts at the left-hand station, while cylinder sleeves are soldered to the bores of transmission clutch housings at the right-hand station of this 30-K.W., 9600-cycle unit.

As cleanliness of the parts is essential for successful soldering, they are passed through an alkaline pressure type washer, which removes oil and foreign matter that might prevent the soldering alloy from flowing properly. After the flux and the preformed silver solder ring have been applied to the assembly, it is placed on the induction heating machine as shown. The assembly is rotated to insure

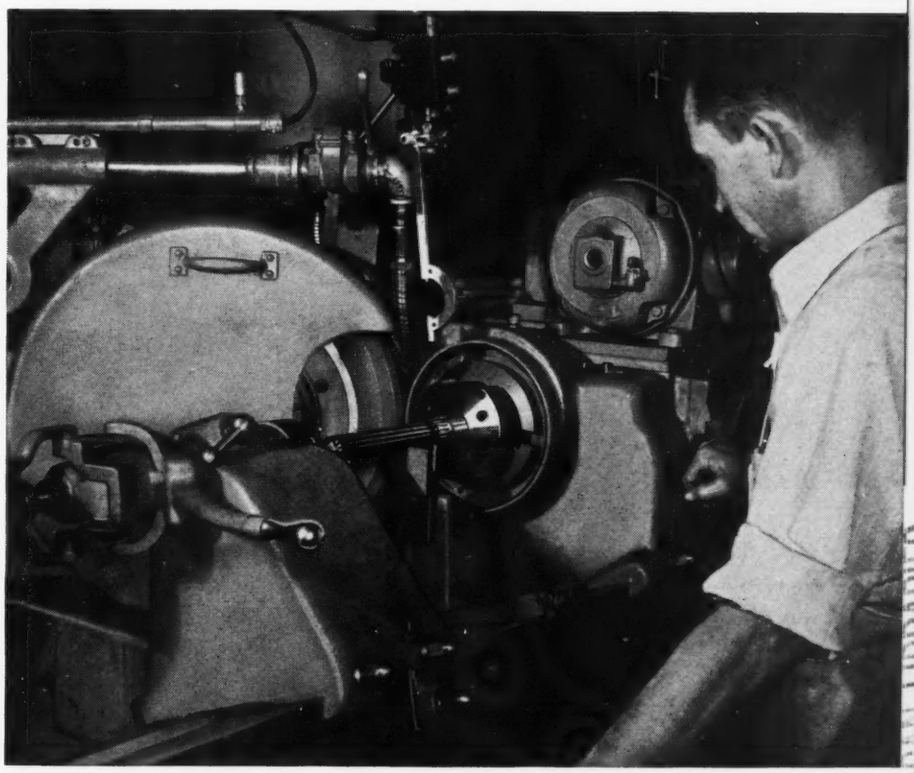
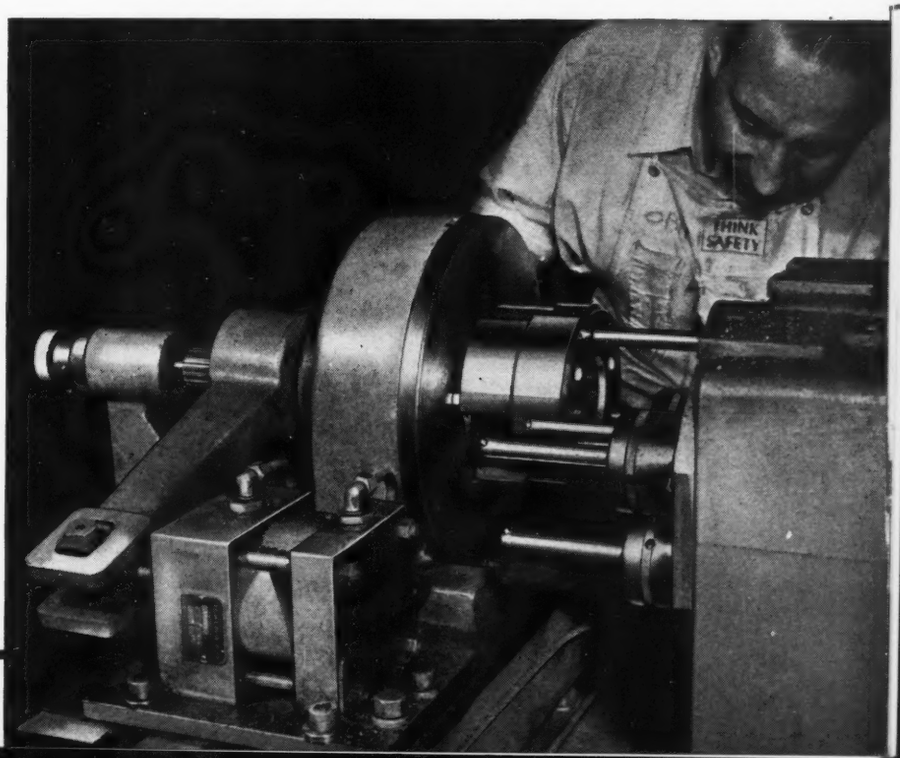


Fig. 14. Bearing hubs are ground to within 0.0003 inch of the desired size and adjoining faces on the planetary cage and output shaft assemblies are finish-ground at the rate of seventeen per hour

Fig. 15. Set-up for boring six pinion-shaft holes in front and rear cages and output shaft assembly. Three holes are bored in the position shown, and the work is then relocated for boring the other holes



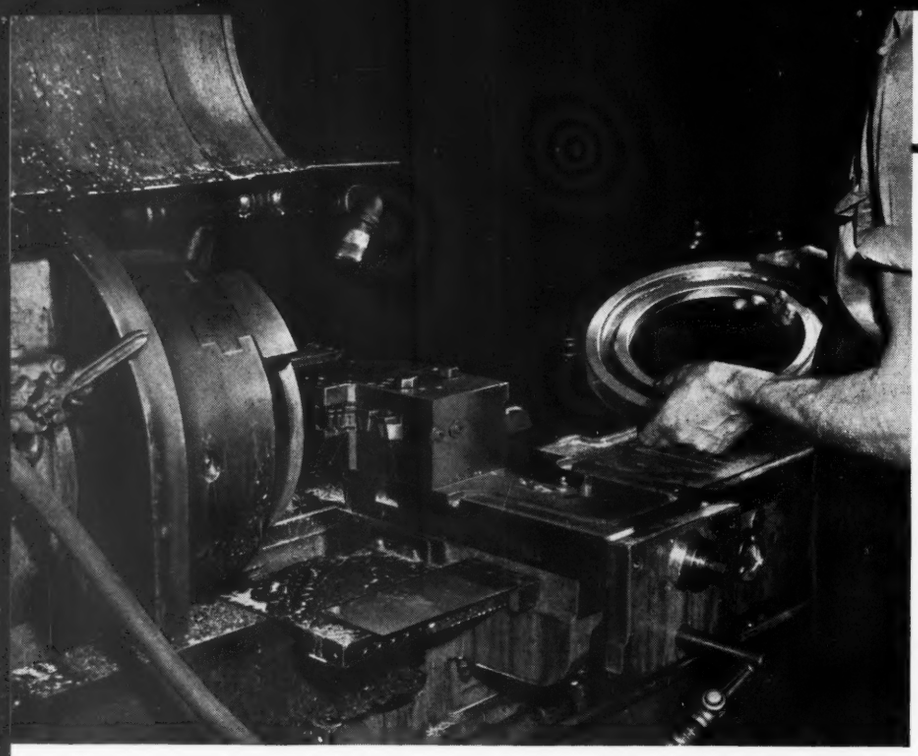


Fig. 16. Thirty-two converter clutch pistons are rough-bored, semi-finish-bored, turned, grooved, and faced an hour in the set-up here illustrated

uniformity of heating. A production of thirty-four parts per hour is obtained—seventeen cage and shaft assemblies and seventeen clutch-housing assemblies.

Following the soldering operation, the bearing hub and adjoining face on the cage and shaft assembly are finish-ground on Norton cylindrical grinding machines of the type illustrated in Fig. 14. These machines are equipped with angular heads and bevel-face grinding wheels, 20 inches in diameter by 3 inches wide. The diameter of the bearing hub is ground to size within a tolerance of 0.0003 inch. The production on this operation is seventeen assemblies per hour from each machine.

About 0.012 inch of stock is removed from the bearing hub, and 0.006 to 0.010 inch from the face. A 54-grit, vitrified-bond, aluminum-oxide abrasive wheel is employed, rotating at a surface speed of 550 feet per minute. The work is held between centers and rotated at 200 R.P.M., giving a surface speed on the hub diameter of 65 feet per minute. The grinding wheel is fed by hand at the rate of 0.0003 inch per revolution. An Arnold automatic work-sizing gage is provided on the machine to check the diameter of the bearing hub during grinding.

Next, the front planetary cage is bolted to the rear cage and output shaft assembly, and six pinion-shaft holes are precision-bored in the new assembly. This is accomplished on a six-spindle New Britain cam-operated boring machine (see Fig. 15). As the radial location of the pinion-shaft holes is too close to permit boring all holes at

Fig. 17. A high degree of flatness is obtained on the pressure surface of the clutch piston by removing a small amount of stock with a high cutting speed and a light feed

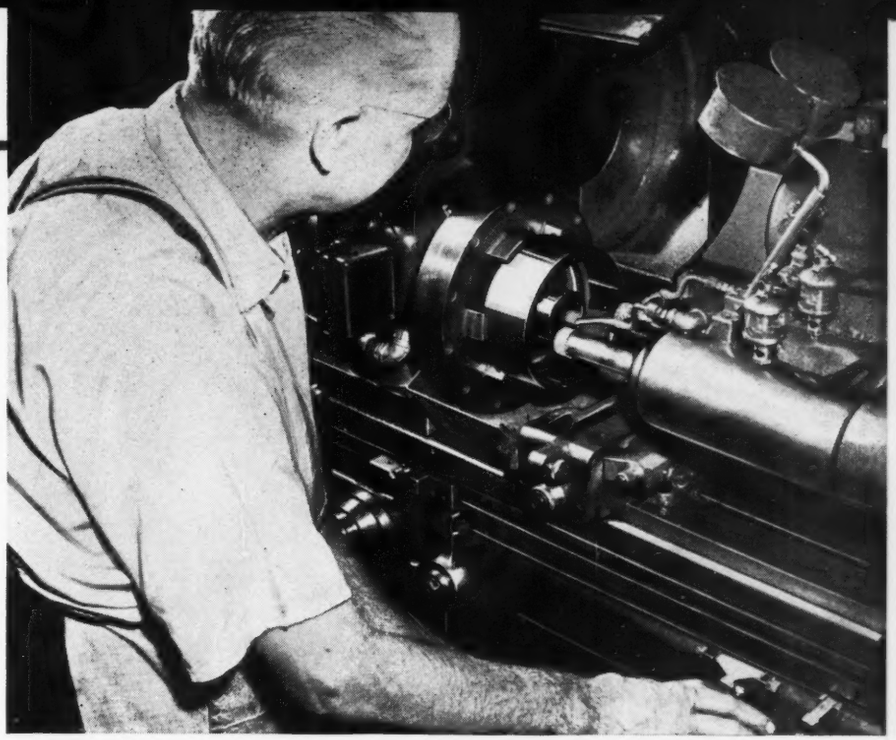


Fig. 18. Two internal surfaces — the sleeve bore and the outside diameter of the internal hub — are ground simultaneously to insure concentricity

once, three of the holes are bored with the work in the position shown, and the table is then automatically moved to bring the other three holes into alignment with the remaining spindles. Three of the holes are located on one bolt-circle, while the other three are on another circle. A special hydraulically actuated work-holding fixture is employed to insure accurate radial location of the holes.

In this operation, approximately 0.020 inch of stock is removed from the pinion-shaft holes, with the boring-bars rotating at 2200 R.P.M. (515 feet per minute). The single-point, carbide-tipped boring tools are fed at the rate of 0.003 inch per revolution. A tolerance of ± 0.0005 inch is maintained on the hole diameters, (0.6341 inch), and ± 0.001 inch on the radial location. The need for a subsequent reaming operation has been eliminated by the close tolerances maintained on this operation. Fifty-one assemblies are bored per hour.

Converter clutch pistons for the planetary transmissions of the Ultramatic drive units are rough- and semi-finish-bored, turned, grooved, and faced on the Sundstrand automatic stub lathe shown in Fig. 16. The pearlitic malleable-iron casting is located by its rough periphery, with the cast circular groove facing outward, in a three-jaw pneumatic chuck.

Carbide-tipped tools are employed for the operation, five being mounted on the front slide and three on the rear slide. Both cam-controlled slides move through pre-set paths, completing all of the operations in a 1 7/8-minute cycle. The

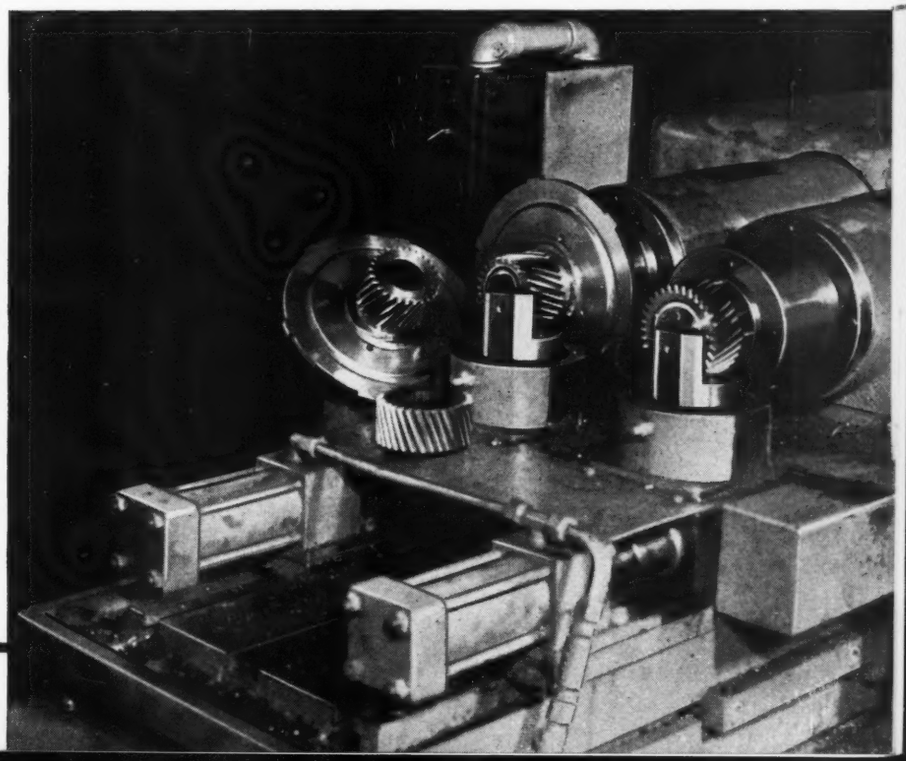


Fig. 19. Ball races are generated in the solid faces of both front and rear sun gears by the use of small single-point solid carbide tools that pivot about the rotating work-pieces

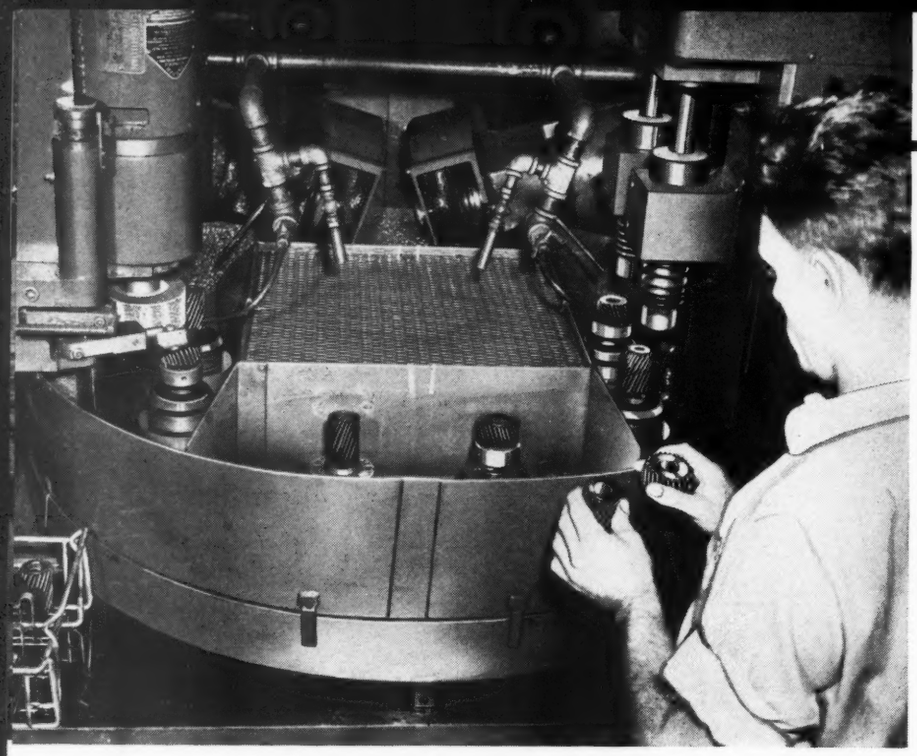


Fig. 20. Four-station combination grinding, wire-brushing, and honing machine for finishing the hubs on both long and short transmission pinions

tool seen at the left on the front tool-slide roughbores a 7.970-inch diameter hole in the piston, and the next two tools semi-finish-bore and chamfer this hole. The periphery of the casting, 11.874 inches in diameter, is semi-finish-turned by means of the tool bit seen mounted at the right of the front slide. A rounded bit at the left of this tool forms the large circular groove in the face of the part to finish size and depth. The three faces on one side of the cast piston are machined by means of the three tools mounted on the rear slide.

Stock removal from the various surfaces averages about 3/16 inch. The speed is 250 surface feet per minute, and the feed 0.015 inch per revolution, giving a production of thirty-two pistons per hour. Locating the part by the semi-finished bore in a similar lathe, the opposite side of the casting is then faced, the remainder of the periphery is turned, and ring grooves are formed in the outside.

The pressure surface of the piston, which contacts the cork face of the planetary transmission converter clutch, is finish-faced on a Hoern & Dilts vertical precision boring machine, as shown in Fig. 17. This surface was previously finish-ground, but the smooth finish obtained in this way decreased the operating efficiency of the clutch. On the other hand, too rough a surface had to be avoided in order to prevent undue wear of the cork facing. By using the machine shown, with a high surface speed and a light feed an accurate flat surface, with the most suitable finish, is obtained.

In the same operation, the piston is finish-

(Concluded on page 163)

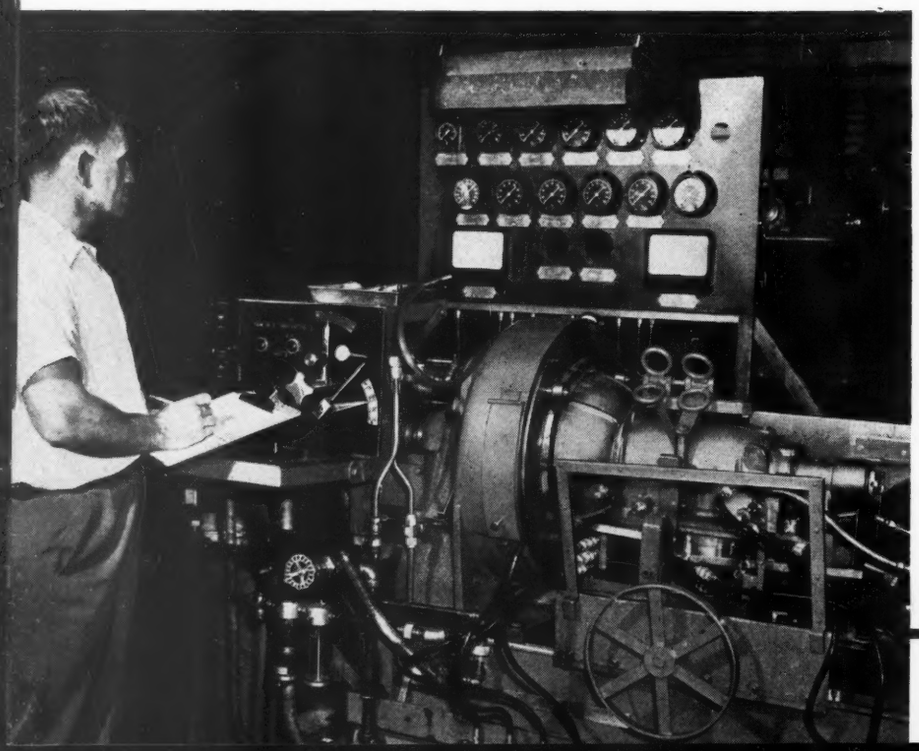


Fig. 21. Test stand employed for final inspection of the Ultramatic drive unit. Pressures, speeds, temperatures, and torque are noted under various driving conditions

Labor-Management Cooperation is a Two-Way Proposition

CONGRATULATIONS to Secretary of Commerce Charles Sawyer for his breadth of vision in proposing, during a recent address before the National Management Engineering Clinic, that management and labor jointly undertake a cooperative program "for the strengthening and maintaining of our free enterprise system." The Secretary stated that such a program should be designed to reduce costs and increase production, and that the benefits should be distributed to labor, management, stockholders, and the public —not to capital alone or labor alone.

Greater productive efficiency seems to be the only salvation for our economic system in this period of constantly increasing labor costs resulting from the frequent demands for higher wages, pensions, etc., and of insistence by the public for lower prices. Obviously, higher costs and lower prices are not consistent with each other.

Greater production can be achieved through wider application of the latest types of manufacturing equipment, but equally important is a greater individual effort on the part of the workers. This would require a change in attitude by most labor leaders. It is of considerable significance that individual productivity rose appreciably during the last several months as factory jobs became scarcer.

But higher individual efficiency should be an objective even in boom times. Secretary Sawyer undoubtedly had that in mind. Successful management of business enterprises requires the cooperation and esteem of labor, and management would gladly accept an olive branch extended by labor on the problem of greater individual productivity, but labor is rarely vocal on that subject.

Secretary Sawyer, as the representative of business in President Truman's Cabinet, has spoken to business on behalf of labor-management cooperation. How about a similar expression to labor from the Secretary of Labor? Cooperation cannot be one-sided.

One of the first concessions of labor leaders, in a move toward cooperation, might well be to stop making derogatory references to business leaders. Labor union magazines habitually defame employers; business men will not soon forget that when one of the most prominent men in labor circles appeared before the President's Fact-Finding Board, he called the steel executives present "the most sanctimonious board of professional racketeers in this country."

Harsh words like these do not promote harmony. Labor-management cooperation is a two-way proposition!

Charles O. Herb

EDITOR

Design of Hoppers for

DURING the last few years, industry has given considerable attention to automatic equipment for assembly work. For this reason, tool engineers and machine designers are often faced with the problem of designing mechanisms to pick up parts from hoppers for delivery to the assembly machines.

By "hopper feeding" is meant the indiscriminate dumping of a load of parts into a hopper of suitable size and shape, from which the parts are picked up, in the proper position, and deposited in a track for feeding to a machine by gravity. Ordinarily, the pick-up member is so shaped that the parts cannot enter the track if they are not in the right position, and therefore are dropped back into the hopper. Occasionally, the shape of the part and the speed requirements of the machine make it necessary to pick up parts that are not all in the same position. In that case, prior to going into the assembly machine, the parts are required to pass through an auxiliary mechanism, or separator, which arranges them all in the required position.

Many types of hoppers have been designed and built with varying degrees of success. One type of hopper may work successfully for a part of a certain shape, but may prove entirely unsuitable for pieces of a different contour. A great deal of thought must be given to the selection of a hopper for any particular job. Every new problem is unique in some respect, and will necessitate variations in the type of hopper selected.

Centerboard Design of Hopper

Fig. 1 illustrates the centerboard hopper, a highly successful type when used to pick up parts within its limitations. The hopper body may be made of cast iron or cast aluminum, or it may be of welded steel construction. Side and end section views illustrate the general construction.

An arm *A* actuates a hardened centerboard blade *B*, which oscillates up and down through the mass of parts, picking up a few of them in the groove machined in its top edge. At the top of the stroke, this groove is in line with a track or tube *C*, and the parts slide down toward the machine. When the track is full of parts, those remaining on the centerboard fall back into the hopper. It is important, when the track is full, for the end of the last part to come flush with the end of the track. If it should project into the hopper, a jam would occur when the centerboard rose on the next stroke.

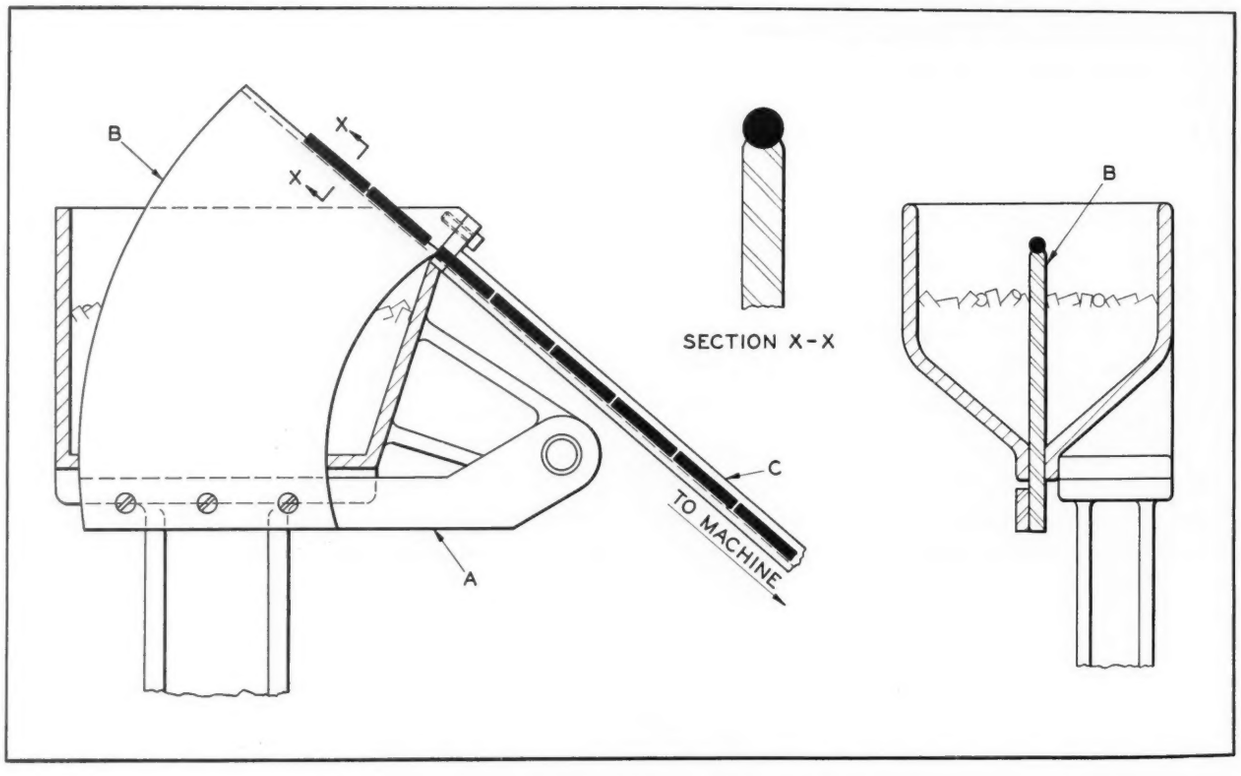


Fig. 1. Centerboard hopper often used for picking up rod-shaped work or parts of angular cross-section, depending upon the design of the blade

Automatic Machines

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Another important design factor is to so lay out the centerboard arcs that the point of delivery, where the track joins the centerboard blade, is as high as possible. In that way, the greatest number of parts can be placed into the hopper at one time, and it will not be necessary to refill it as often. The author knows of at least one case where the delivery point on several hoppers for the same machine was placed so low that the capacity of the hopper was too small for the speed at which the parts were being taken out. Careful thought to good hopper design will prevent these costly mistakes.

Section *X–X* shows the correct form for the top portion of the blade when used to pick up parts of round cross-section. It will be noted that the centerboard width is the same as the part diameter. However, it is machined so that it will bear on only one-quarter of the part diameter. This form has been found highly successful.

The centerboard blade should be chromium-plated. This serves two purposes. It allows the parts to slide more freely into the track, and the slippery surface thus provided prevents wedging of the parts between the blade and the bottom of the hopper on the downward stroke of the blade.

A cam is generally employed to actuate the blade, so that it will have a slow upward travel and a quick return. However, cranks have been used successfully for this purpose. They are run at speeds not greater than 40 R.P.M.

The centerboard type of hopper is recommended for all round parts having a length greater than twice the diameter. It can also be used for small disk-shaped parts by machining the groove at the top of blade to a depth of one-half the part diameter, as shown at *A* in Fig. 2.

An interesting application of centerboard hopper design is shown at *B* in Fig. 2. Here the blade *C* is machined at an angle, so that parts with angular projections can be picked up facing in only one direction. A stationary baffle plate *D* must be incorporated in this design to slide the parts over into the correct position at the top of the stroke. It can be seen that a part cannot be picked up in the wrong position, since it would slide off the edge of the blade, as shown at the right.

Rotary Centerboard Hoppers Applicable to Many Automatic Machines

The rotary centerboard type of hopper can be applied to many automatic machines. By varying the blade cross-section, it can be easily adapted for parts of different shapes. This hopper has been found to be exceptionally satisfactory for channel-shaped parts of the type shown in Fig. 3.

The rotary blade *A* is given an intermittent motion, either by a Geneva wheel or by a pawl and ratchet arrangement. The latter, because of its comparatively low cost, is generally used. As in the previous case, the blade should be hardened and ground, and then chromium-plated.

As with all hoppers for feeding parts, the wheel rotation should be as slow as possible, con-

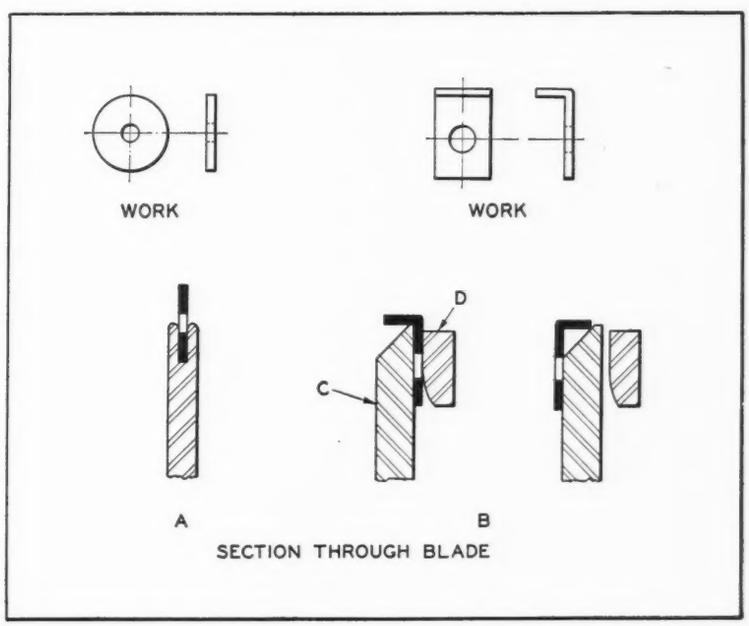


Fig. 2. Blade designs used for picking up parts of the design shown above in centerboard hoppers

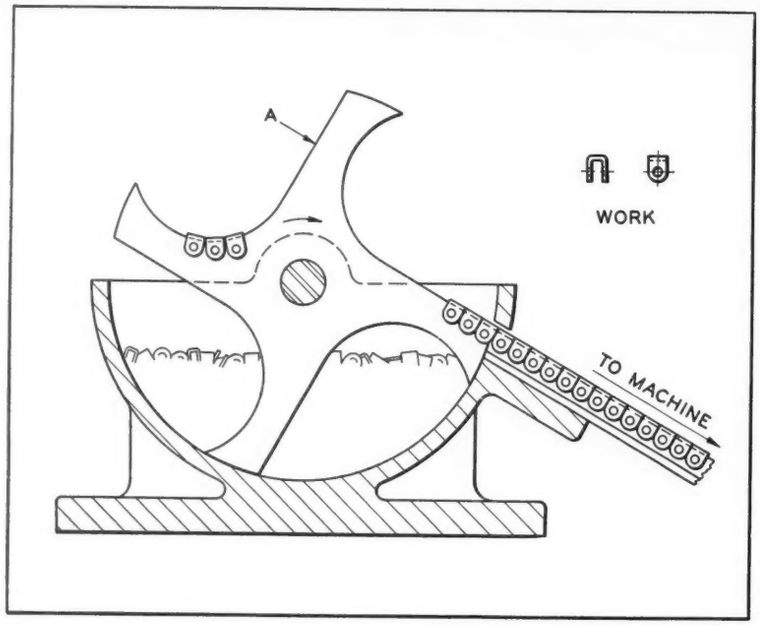
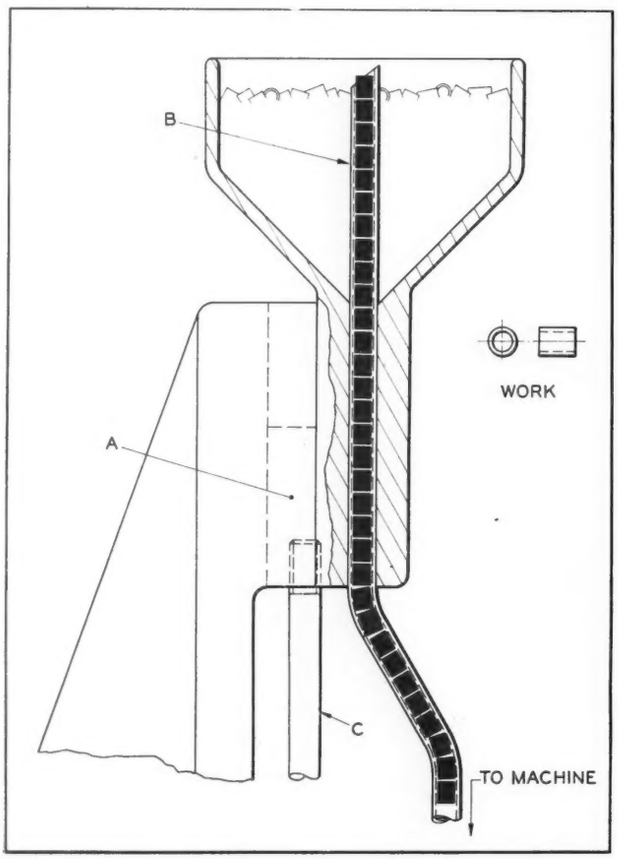


Fig. 3. Rotary centerboard hoppers are especially useful for feeding channel-shaped parts to automatic machines

sidering the feed requirements of the automatic machine which it is supplying. An ideal drive consists of a cam-operated ratchet, with a quick-return pawl and a slow blade movement. A slight dwell lobe should be incorporated in the cam at the point where the blade comes opposite the track. This gives time for the parts to slide from the hopper blade to the track. The cam should be of the harmonic motion type that allows the wheel to start slowly, accelerate gradually, and finally come to a stop. In that way, the parts that have been picked up on other arms of the rotary blade will not be knocked off by abrupt stops.



Tube and Rotary Types of Hoppers

Fig. 4 shows a good design of hopper for feeding short parts, such as illustrated at the right. The hopper body consists of a cast funnel which has a dovetailed slide *A* machined in its lower side. The feed-tube *B* is a sliding fit in a reamed hole in the hopper body as shown.

In operation, the hopper body is given an up and down movement by the actuating rod *C*. On the downward stroke, a number of parts enter the open end of the tube and slide down to the machine. The open end of the tube is machined at an angle so that, if a part falls crosswise of the opening, it will be knocked off by other parts on the upward stroke of the hopper. When the feed-tube is required to be bent, as shown, the inside diameter of the tube must be sufficiently greater than the diameter of the part so that the parts will not bind in turning the corner.

The rotary type of hopper has proved practical on a wide variety of jobs. As illustrated in Fig. 5, it consists of a large round container *A*, mounted at an angle, with grooves machined in the baseplate *B*. When the baseplate rotates, some of the parts in the bottom of the hopper fall into the grooves in the baseplate and are carried up in line with the opening in track *C*. When the track is full, succeeding parts are carried past

Fig. 4. Design of hopper employing a reciprocating motion to feed short parts into a stationary tube down which they fall to the machine

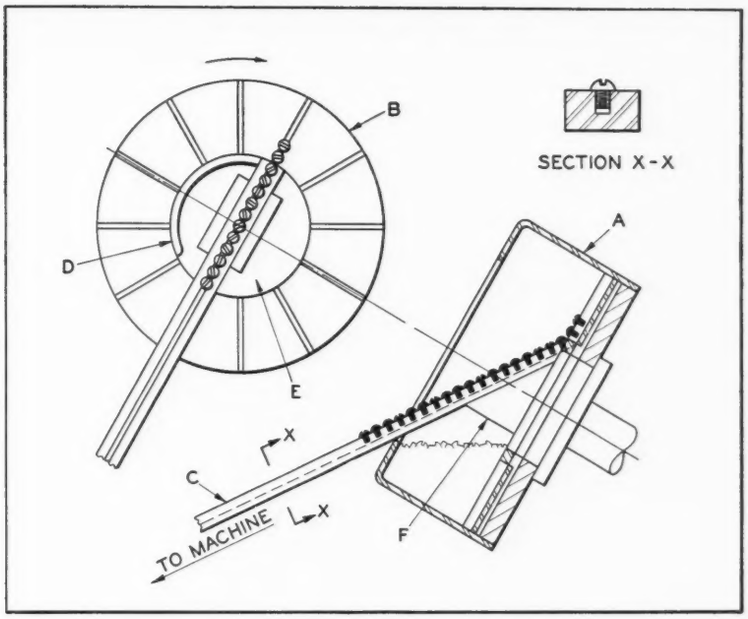


Fig. 5. A wide variety of work, such as screws, can be easily handled by rotary hoppers of the design shown

the track opening and fall back into the bottom of the hopper.

A baffle *D* is mounted on the stationary center *E* as shown. This prevents the parts that have been picked up from falling back into the hopper before they have passed the track opening. The track is mounted on a stationary bracket *F*. The set-up illustrated was designed for feeding short screws to an automatic screwdriver.

Inexpensive Type of Hopper for Feeding Flat Work of Both Round and Square Shapes

The hopper shown in Fig. 6 is used for feeding flat work varying in shape from square to round. It is an inexpensive and very efficient design for such parts. Section *X–X* shows the shape of the groove at the bottom of the hopper. The parts that fall into this groove are pushed up the incline by the paddle wheel *A*. When the parts have been pushed up far enough, they enter the track *B*, down which they fall to the machine. When the track has become full, the succeeding parts ride up the baffle *C*, as shown, and fall back into the hopper.

Design of Hopper for Intricate Shapes

The barrel type of hopper, while more expensive to build, is sometimes the only one that will successfully select parts of very intricate shape, including those that interlock when grouped together. It consists of a rotating hopper *A*, Fig. 7, which is shaped like a barrel and is open at both

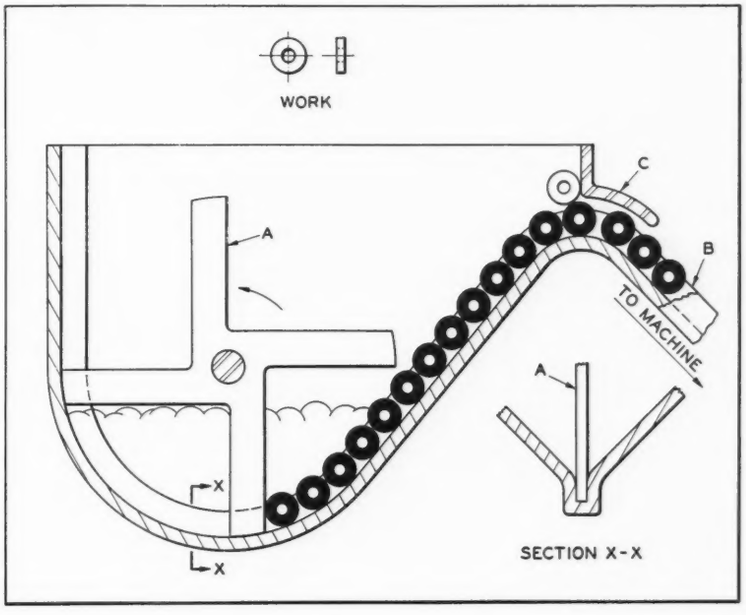
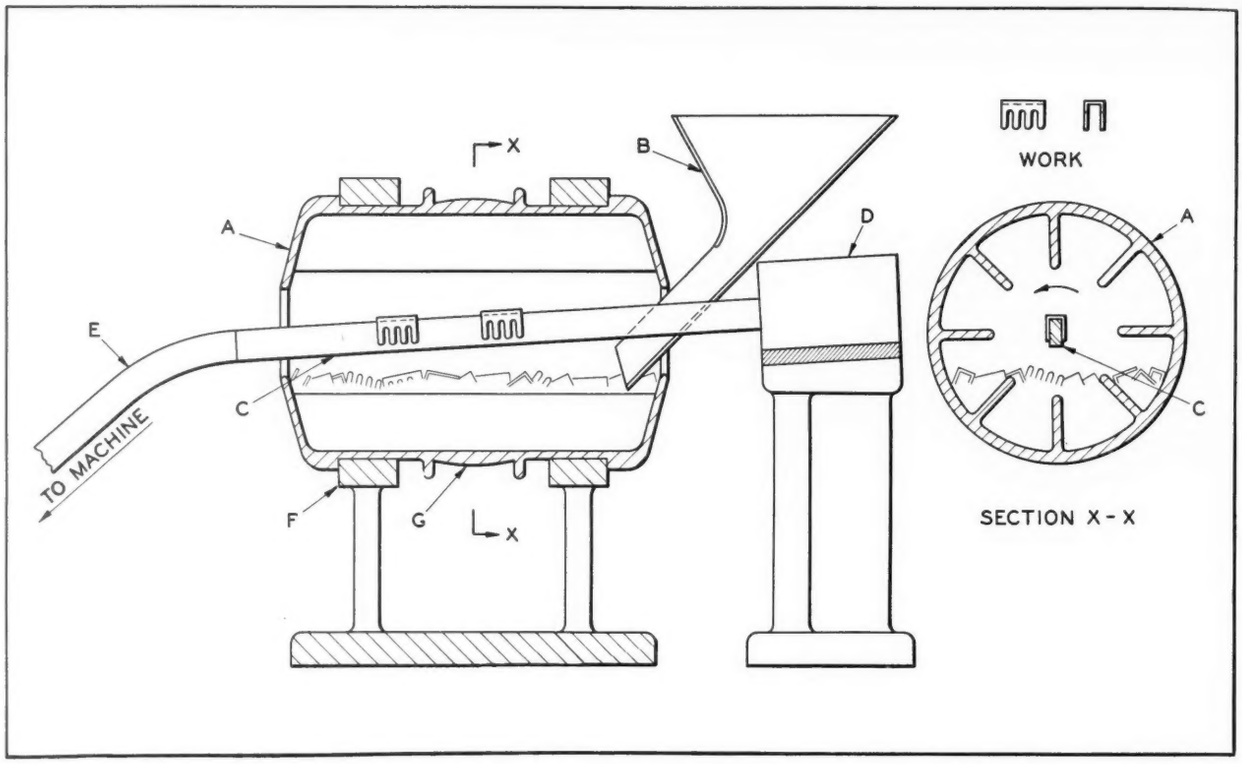


Fig. 6. The paddle-wheel hopper is employed for feeding flat work, varying in shape from square to round



ends. The parts are dumped into hopper *A* through a loading hopper *B*.

On the inside of the rotating hopper are cast longitudinal fins, as shown in section *X–X*. Rotation of the hopper, which is mounted on bearings *F* and driven by the pulley *G*, causes the parts to flow in a steady stream down a blade *C*, which is set at a slight angle and connected at one end to an electric vibrator *D*. The other end of the blade is aligned with the track *E*, which leads to a machine.

The constant agitation of the parts resulting

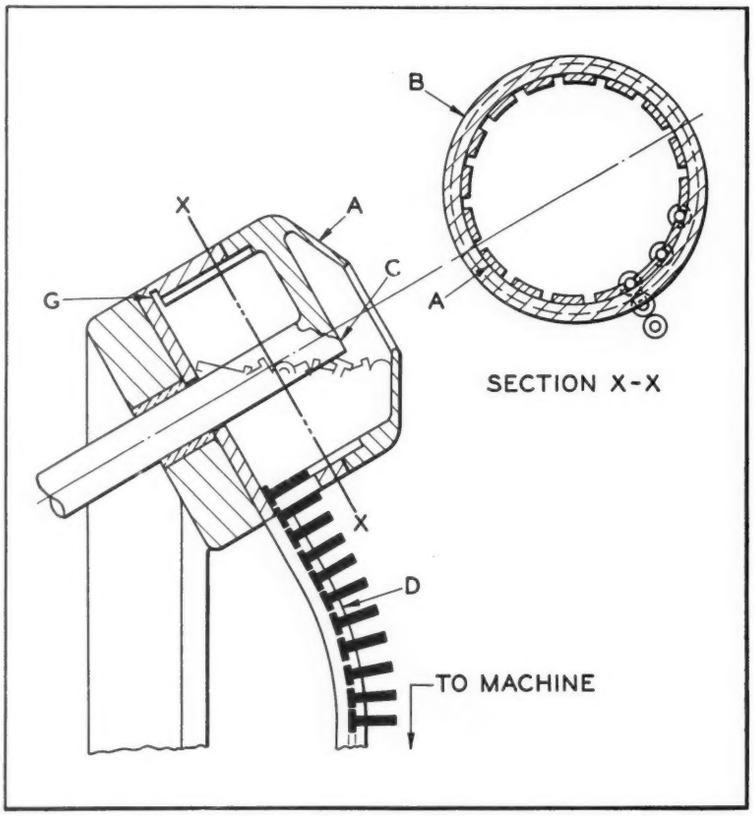


Fig. 7. (Above) Barrel hoppers successfully select and feed work of intricate shape, including parts that interlock when grouped together

Fig. 8. (Left) Rivets can be selected and fed to machines in the correct position for the riveting operation by a hopper of the type shown

from this arrangement prevents interlocking, and some of the parts will fall on the blade in the right position. Vibration of the blade causes the correctly positioned parts to move toward the track and enter it. The loading hopper shown makes filling of the rotating hopper an easy matter.

Hopper for Feeding Rivets and Similar Shaped Parts

The hopper shown in Fig. 8 is designed to select and feed rivets to a machine in the correct position for the riveting operation. However, it can also be used for many special parts of similar shape. The rotating portion *A* of the hopper body contains a series of grooves as shown. Reentrant groove *G* is machined in the stationary part *B* of the hopper body to accommodate the rivet heads. Rotation of the hopper by driveshaft *C* allows a few rivets to enter the slots. When they are opposite the track *D*, an opening in the body allows the rivet heads to enter the track, and the rivets slide down toward the machine.

Inexpensive Type of Hopper for Comparatively Low Production

The tray type hopper is a cheaply built hopper for feeding larger parts in comparatively low production. The operator places the parts in the tray *A*, Fig. 9, and they are moved toward the track *B* by vibration. An agitator *C*, operated by a small crank, prevents jamming at the mouth of the track.

The construction is simple. A vibrating plate *D*, set close to the bottom of the tray, is connected to the rods of a commercial electric vibrator *E*. The angle at which the tray must be set is determined by experiment, and is usually about 4 or 5 degrees.

Vibratory Hopper for Greater Production Requirements

Where greater production requirements exist, the hopper illustrated in Fig. 10 will be found applicable to a wide variety of parts. It consists of a commercial vibratory feeder *A*, suitable guiding baffles *B*, a hopper *C*, and an agitator *D*.

The parts are dumped into the hopper, and the action of the vibratory feeder causes them to flow in a steady stream from its mouth. Owing to the slight incline of the pan, the parts flow toward the track *E* being guided by the baffles. As in the previous case, an agitator prevents jamming at the track mouth. A gate *F* is incorporated at that point, so that only one part can

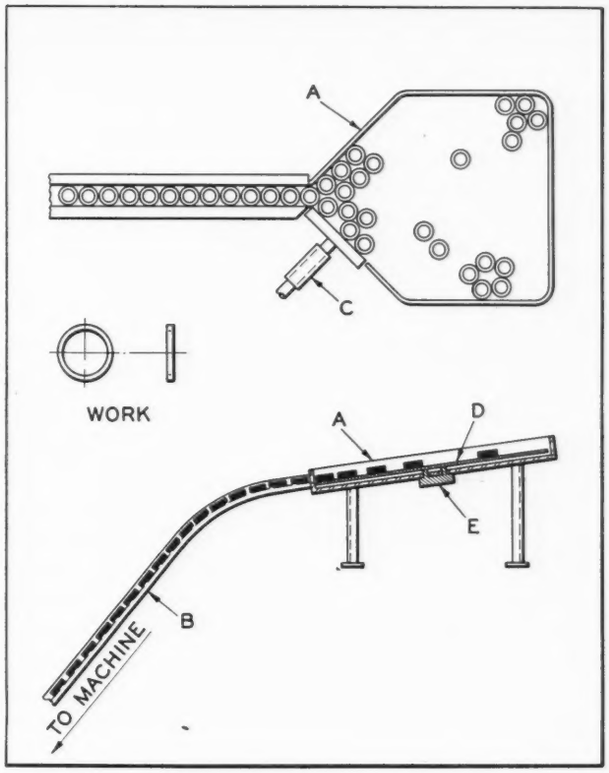
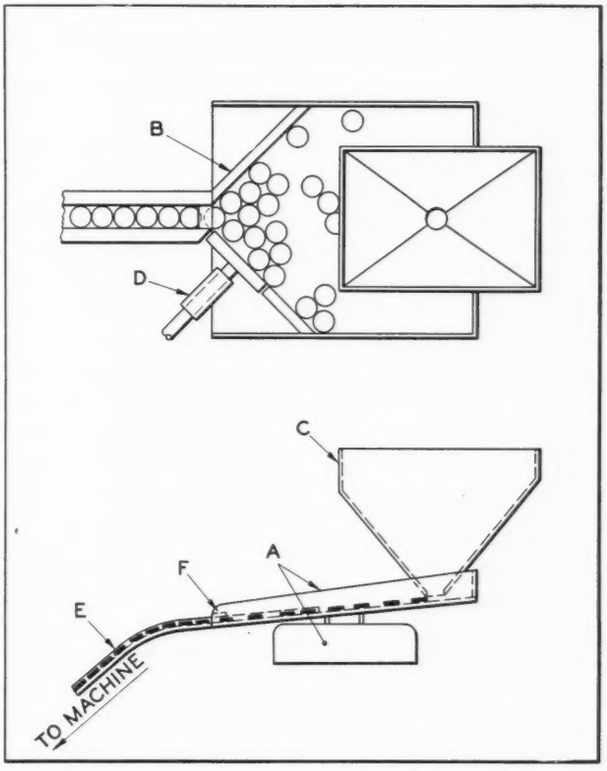


Fig. 9. Tray hoppers are built cheaply for feeding large parts to machines at comparatively low production rates

Fig. 10. High-production requirements are met by using hoppers of vibratory design for feeding work to machines



go through at a time. If a part is lying on top of another, the gate will prevent both from going through at once. The vibration will cause the lower part to enter, while the top part will fall off and enter the track in its turn. This type of hopper can be adapted to different parts by simply changing the track and varying the size of the hopper mouth.

Hopper of Magnetic Design

An interesting hopper application is shown in Fig. 11, where Alnico magnets *A* are used to pick up the parts from the hopper *B*. The magnets are incorporated in a conveyor belt which passes through the parts, some of which cling to the magnetic stations and are carried up. The stripper and side-guide arrangement *C* properly locates parts that were not picked up in quite the right position. In case one magnet picks up two parts, the side guide will strip the extra part, which falls back into the hopper.

At a point tangent to the top pulley, a track *D* strips the parts from the magnets. The track must be made of a non-magnetic material at that point. Further down, the parts pass through a demagnetizer if the magnetic properties imparted to them are objectionable.

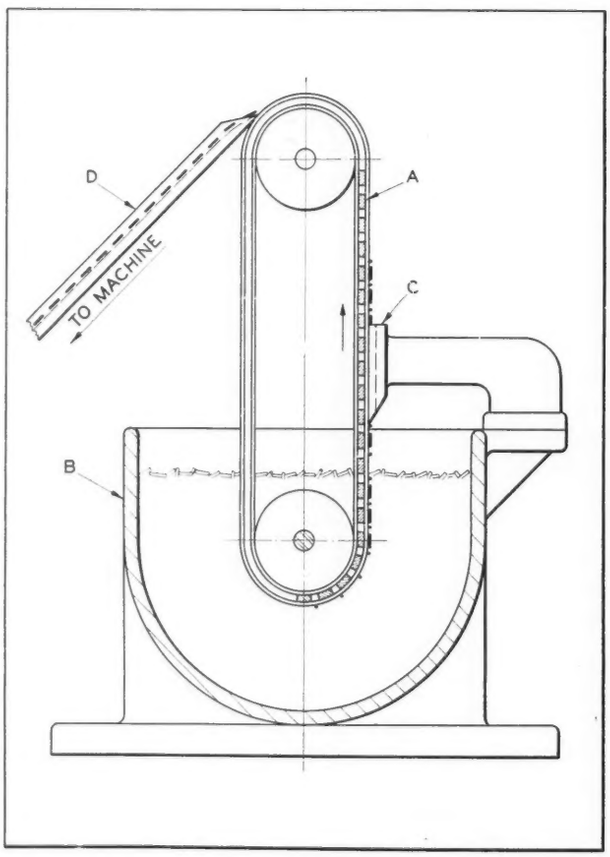


Fig. 11. Alnico magnets are incorporated in this hopper. Parts are picked up by magnets attached to a conveyor belt and are carried to a track for feeding to a machine

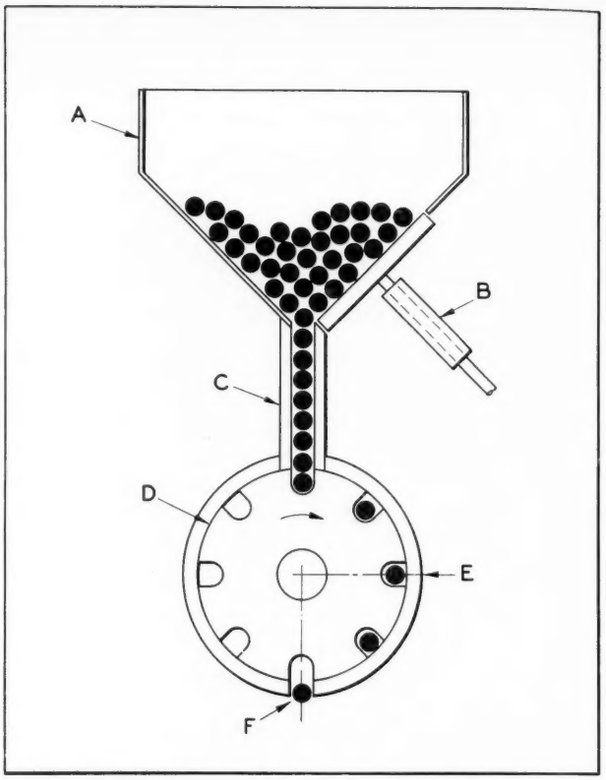


Fig. 12. A simple hopper for feeding long rods includes an agitator and a transfer wheel which indexes to carry rods to a work station for drilling or other operations

Simple Hopper for Feeding Long Rods

Fig. 12 illustrates a simple hopper for feeding long rods to an automatic machine. The rods are loaded into the hopper *A*, and an agitator *B* insures a constant flow into the track *C*. At the lower end of the track, the rods enter grooves machined in a transfer wheel *D* and are carried to a work station *E* as the wheel indexes. At that point, the parts are automatically clamped and held securely while drill heads machine a hole in each end. At the ejection station *F*, the rods fall out into a box.

A consideration of the various types of hoppers described in this article will show that almost any type of small part can be fed successfully by such devices. Often, a slight change in the design of the work will greatly enhance the possibility of feeding it automatically.

It is impossible to give definite rules for the design of feeding devices, as every job presents its own individual problems. However, practically every hopper will fall within one or more of the basic types here described.

* * *

In 1948, there were 12,440,000 passenger cars that were ten years old or older—representing a potential market for new cars.

Packard's Ultramatic Drive Built by Precision Methods

(Continued from page 154)

bored, the ring lands on the periphery of the part are finish-turned, and a shoulder is finish-faced. An air-operated expanding chuck is provided on the spindle of the machine. Micrometer-adjusted tool-holders equipped with single-point carbide tools are mounted on the cam-actuated tool-slides above the work. From 0.010 to 0.015 inch of stock is removed from the various surfaces of the piston. The work speed is 200 R.P.M., or 620 surface feet per minute, and the tool feed is 0.004 inch per revolution. Production averages thirty-five pistons per hour.

An unusual double-spindle internal grinding set-up, Fig. 18, is employed in grinding transmission-clutch housing assemblies to insure concentricity of the sleeve bore with relation to the outside diameter of the hub. The steel cylinder sleeve is silver-soldered to the bore of the cast-iron clutch housing in a previous operation, as described in the foregoing. Both spindles on the Parker-Majestic internal grinding machine used for grinding the clutch-housing assemblies are belt-driven from a single electric motor. The spindles are rotated at slightly different speeds to give the two different-sized wheels a surface speed of approximately 6000 feet per minute.

The clutch-housing assembly is held in an air-operated diaphragm chuck, being located by the previously ground periphery of the part and its closed end. From 0.010 to 0.014 inch of stock is removed from the sleeve bore while grinding 0.008 to 0.012 inch from the periphery of the hub in the housing. A vitrified-bond, 60-grit, aluminum-oxide abrasive wheel is used to grind the steel sleeve, while a vitrified-bond, 46-grit, silicon-carbide wheel is employed for grinding the cast-iron hub. The feed of both wheels is 0.0003 inch per revolution, giving a production of thirty-five housings per hour.

A unique set-up, Fig. 19, is employed to rough, semi-finish, and finish-form a ball race in the faces of both front and rear sun gears. The operation is performed on a New Britain cam-operated, double-spindle precision boring machine. The ball races are generated in the solid faces of the forged-steel parts by single-point, solid carbide tools which pivot about the rotating work-pieces. The radius of the ball races, which is 0.135 inch, is maintained within $\pm$ 0.001 inch, and the location from the rear faces of the parts is held to $\pm$ 0.0005 inch. Surface finish of the ball race must not exceed 6 micro-inches r.m.s. On this operation, a production of eighty-four parts (42 front and 42 rear sun gears) per hour is obtained.

The ball race, which has a total depth of 0.031 inch, is progressively cut in three steps, removing 0.015 inch in a roughing cut; another 0.010 inch in semi-finishing; and 0.006 inch in finishing. The small solid carbide tools, which must be ground and honed during sharpening to obtain a satisfactory life between sharpenings and produce the fine surface finish necessary, have an accurately controlled nose radius of only 0.007 inch. Tools are fed at the rate of 0.005 inch per revolution for roughing, 0.003 inch per revolution for semi-finishing, and 0.001 inch per revolution for finishing. The work-pieces, located on air-operated expanding arbors, are rotated at 350 surface feet per minute.

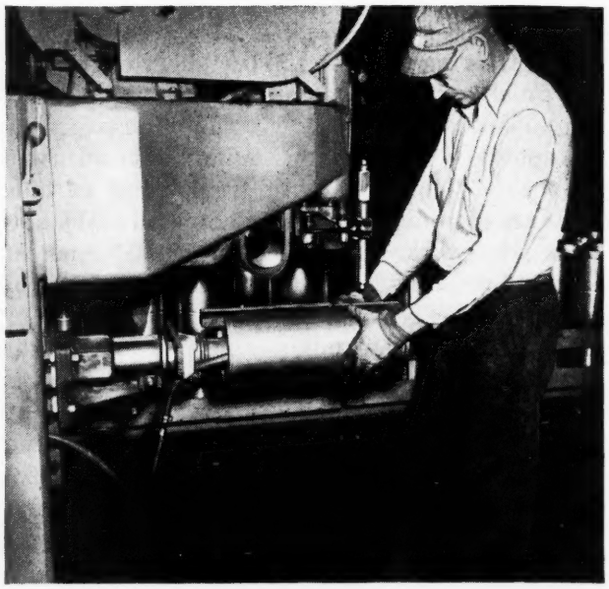
The hubs on both ends of the planetary transmission pinions are ground and honed, and the teeth are wire-brushed, on the Hoern & Dilts four-station, vertical indexing machine illustrated in Fig. 20. Two work-holding fixtures—one for long and one for short pinions—and double tool-spindles are provided at each station. After one end of each part has been completed, the pinion is reversed in the fixture and the cycle repeated. The parts are located vertically by the previously honed bores.

After one short and one long pinion have been loaded on the fixtures at the first station, the parts are indexed to the second station, seen at the left. Here two grinding wheel heads carried on a vertical slide are fed by a cam to a positive stop, in order to insure dimensional control. Resinoid-bonded, 46-grit, aluminum-oxide abrasive wheels, 5 inches in diameter by 3 inches wide, rotating at 6000 surface feet per minute, remove about 0.010 inch of stock.

At the third station, rotary wire brushes, 12 inches in diameter by 2 inches wide, rotating at 4000 surface feet per minute, remove the fine burrs formed during grinding. Hand-filing is thus eliminated. At the fourth station, seen at the right, the end surfaces of the pinion hubs are honed to a fine finish of 16 micro-inches r.m.s. maximum. Spring-loaded 280-grit abrasive wheels, 2 inches in diameter by 1 1/2 inches wide, rotating at 6000 surface feet per minute remove from 0.001 to 0.002 inch of stock in this operation. A production of 240 parts (120 of each pinion) per hour is obtained.

Final inspection of the Ultramatic drive unit is made on the test stand seen in Fig. 21. The unit is rotated at different speeds by a variable-speed motor, and oil heated to a temperature of 140 degrees F. is supplied to the unit. Various driving conditions are duplicated, and pressures, speeds, temperatures, and torque are noted.

Resistance Welding Reduces Weight of Fire Extinguishers



THE adoption of resistance welding for the fabrication of fire extinguishers by the American-LaFrance Foamite Corporation, of Elmira, N. Y., has resulted in an appreciable reduction in the weight of the product. A better appearance is also obtained through the elimination of protruding rivet heads. The first extinguishers to be produced by the new process are the 2 1/2-gallon type. A reduction of 4 1/2 pounds in weight was achieved on this unit, and at the same time the strength was increased materially.

Various steps in the manufacture of this fire extinguisher are shown in the accompanying illustrations. Fig. 1 shows the rolling of the silicon-bronze sheet that forms the cylinder. The rolled sheet is tack-welded along the seam, as seen in Fig. 2, a Z-bar on the welding machine being applied to maintain the shape and diameter during the operation. Following tack-welding, the seam is welded longitudinally on the machine illustrated in Fig. 3.

Next, the upper dome-shaped end of the fire extinguisher is tack-welded to the cylinder, a collar having been seam-welded to the top of the dome prior to this operation. The tack-welded dome and the cylinder are then seam-welded, as seen in Fig. 4, after which the bottom dome is seam-welded in place, as illustrated in Fig. 5.

Finally, a wire is spot-welded inside the lower end of the unit to provide reinforcement, and handles and nameplates are welded to the assembly. [Illustrations supplied through courtesy of the Resistance Welding Institute.]

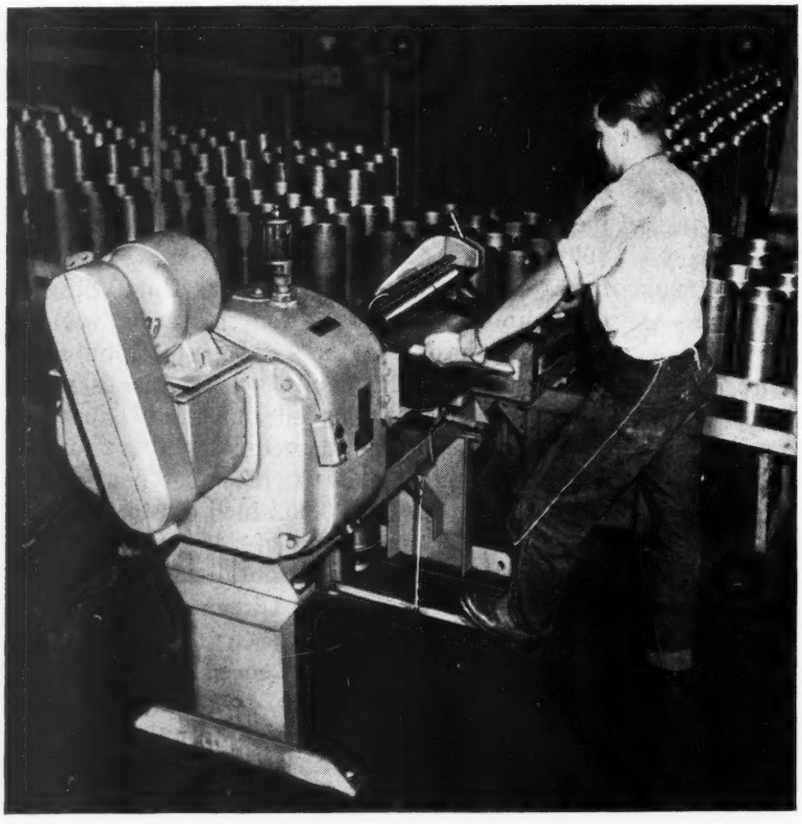


Fig. 1. (Left) Rolling a cylinder from silicon-bronze sheet for use in the fabrication of fire extinguishers

Fig. 2. (Above) Tack-welding the longitudinal edges of fire extinguisher cylinders prior to seam-welding

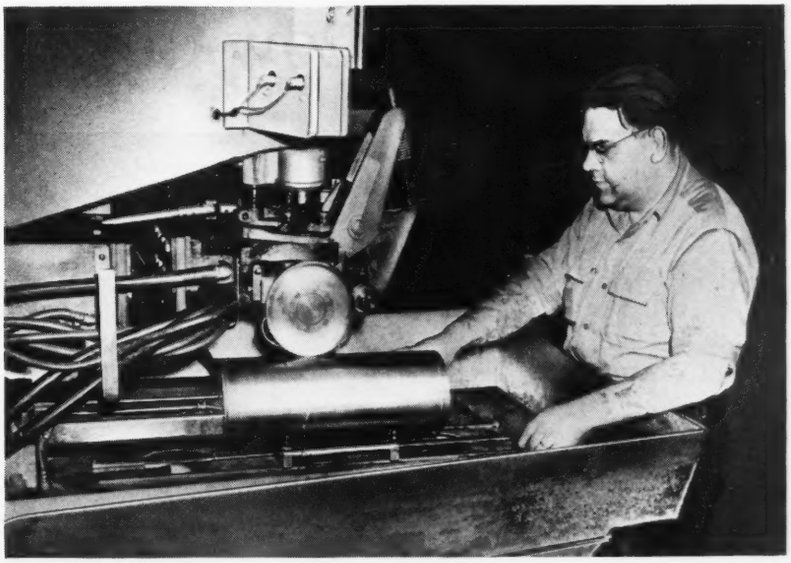


Fig. 3. Seam-welding the longitudinal seam of the fire extinguisher cylinders

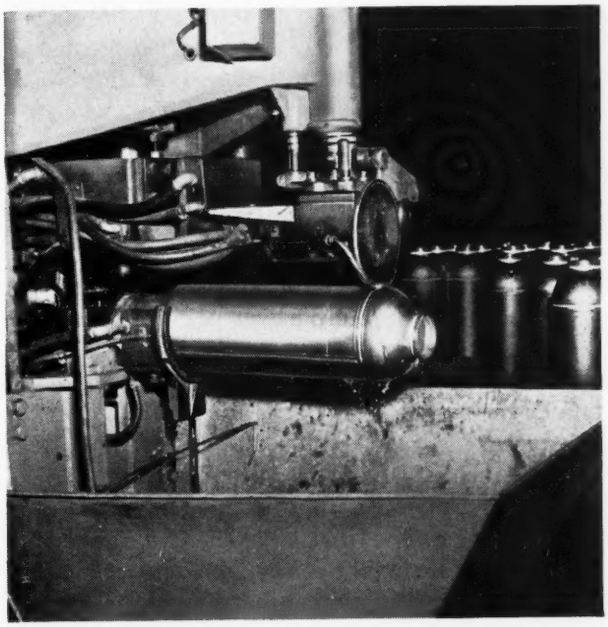


Fig. 4. Seam-welding the top dome to the cylinder, the collar on the dome having been welded in place prior to this operation

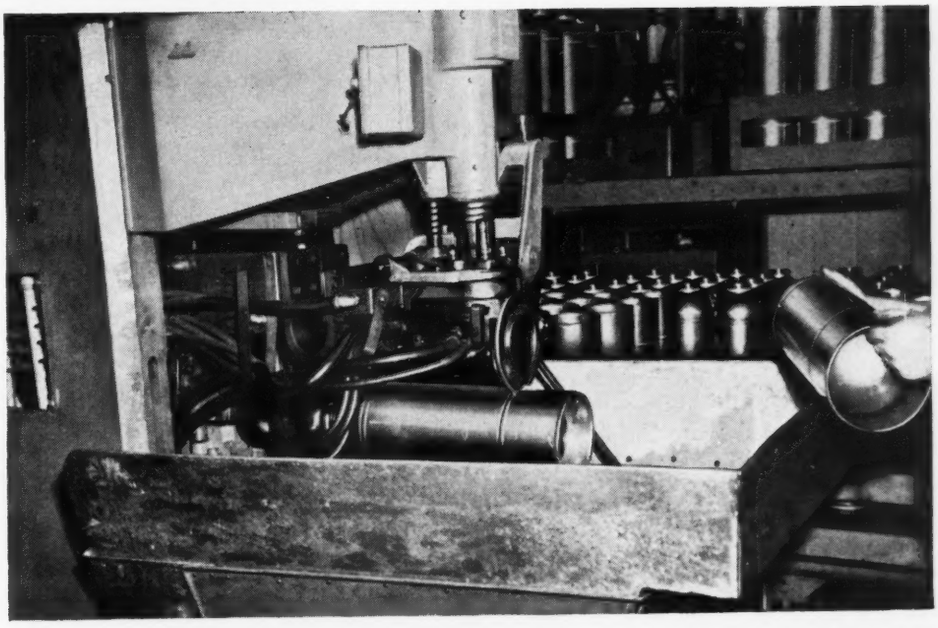


Fig. 5. Welding the bottom end of the fire extinguisher to the cylinder

Low-Cost Production of

By EDWARD F. BAHAN
Vice-President and
General Manager
Bahan Textile Machinery Co.
Greenville, S. C.

Fig. 1. Spring-steel knives of textile-loom thread-cutters are annealed and tempered by means of oxy-acetylene torches in the conveyorized set-up illustrated

ALTHOUGH generous tolerances are frequently specified for textile-loom parts, careful planning and modern manufacturing methods are necessary to maintain low-cost production in this highly competitive industry. A few of the set-ups employed at the Bahan Textile Machinery Co. in producing parts for textile looms are described in this article.

An unusual high-production set-up for heat-treating thread-cutters for looms is seen in Fig. 1. Each cutter consists of a bronze casting to which two spring-steel knives are spot-welded and riveted. The heat of the spot-welding operation hardens the knives, making them too brittle for satisfactory operation. This condition is remedied by annealing the part. Two oxy-acetylene torches, one mounted at each side of the work conveyor, as seen at the left, and directed at the spot-welded area on the part, are employed for this operation. The cutters then pass to a third torch, seen at the right, becoming air-cooled as they are carried from the first two torches to the third. This torch heats the cutting edges or tips of the knives, after which the part falls into quenching oil in a barrel at the end of the conveyor. The heating and immediate quenching gives the cutting edges the required temper.

The motor-driven chain conveyor travels at a speed of approximately 8 feet per minute. It is merely necessary for the operator to place the parts vertically on the conveyor at the left-hand end of the machine. A part falls into the quenching oil every two seconds, 1800 thread-cutters being annealed and tempered per hour.

Top girt-end castings, which support the crankshaft on the textile loom, are faced and recessed for assembly of the bearing caps on the Sundstrand milling machine shown in Fig. 2. Two parts are milled at a time, and the castings are faced and recessed in one set-up by the use of a double cutter. About 3/32 inch of stock is removed from the surfaces of the casting in one pass, the production rate being eight parts per hour.

Two concentric carbide-tipped milling cutters are mounted in the spindle of the machine. The larger cutter is 5 3/4 inches in diameter and contains sixteen teeth, while the smaller is 1 7/8 inches in diameter and has six teeth. The cutters rotate at 100 R.P.M., and the table of the milling machine is fed at the rate of 4 inches per minute. After milling the stepped surfaces on the castings to form the recesses for the bearing caps, a 5/16-inch thick split washer is placed around the spindle between the cutter and the faceplate to which the cutter is bolted. This lowers the large-diameter cutter below the cutting edges of the smaller cutter, and allows the second facing

Parts for Textile Looms

operation to be performed without removing the cutter from the machine or altering the set-up.

After the bearing caps have been assembled to the girt-end castings, the assemblies are bored on a Heald boring machine by means of the set-up seen in Fig. 3. Since the girt ends are spaced from 27 to 60 inches apart on various size looms, the two bearings in each girt end must be carefully bored to insure alignment of the shaft. The part is located from previously milled faces and a keyway that mates with a ground key on the fixture. A dial indicator is employed to insure proper setting before boring and correct alignment in both planes.

The long boring-bar used on this machine is supported between the bearings to be bored and at its end by bearings provided in the fixture. Three carbide-tipped, single-point tools are carried in the bar, two for boring and one for facing. The tools are rotated at 600 R.P.M., and the table is fed at 4 inches per minute. Both bearings are bored and the casting faced in a three-minute cycle. Each bearing is approximately 1 5/8 inches in diameter by 4 1/2 inches long, and about 3/32 inch of stock is removed from the diameter of the work in this operation.

Take-up shaft bevel gears are produced from the blank in a three-minute cycle on the Gleason machine seen in Fig. 4. The cast-iron bevel gears have a pitch diameter of 4 1/2 inches and 36 teeth with a diametral pitch of 8 and a 14 1/2-degree pressure angle. Since a tolerance of 0.002 inch is permitted on the pitch diameter, the teeth do not have to be finish-machined or ground. The teeth on steel gears can be cut even faster on this type machine, only four seconds being required to machine each tooth, compared to the five seconds per tooth for cast iron.

High-speed steel blades are arranged radially in the cutter-head of this machine. The cutter-head is mounted on a reciprocating slide, so that as it rotates, it is also moved in the direction of the tooth space, from the small to the large end of the blank. The cutter makes two passes before reaching its full depth. During the cutting operation, the gear blank is held stationary by means of a hydraulically actuated draw-bar. At the end of each return stroke of the cutter-head, the gear blank is automatically indexed one tooth space. Every-third revolution of the cutter completes a tooth space. The tooth form is determined by the path of the cutter-head and the shape of the blades. A blank and a completed gear may be seen on the machine at the left.

Tapered bearing seats are machined simultaneously on both ends of a textile-loom pick-shaft by means of the set-up illustrated in Fig. 5. The operation is performed on a conventional engine lathe that has been converted to a double-end taper-turning machine. The machine has two independent cross-slides, which are actuated by a single lead-screw that has a right-hand

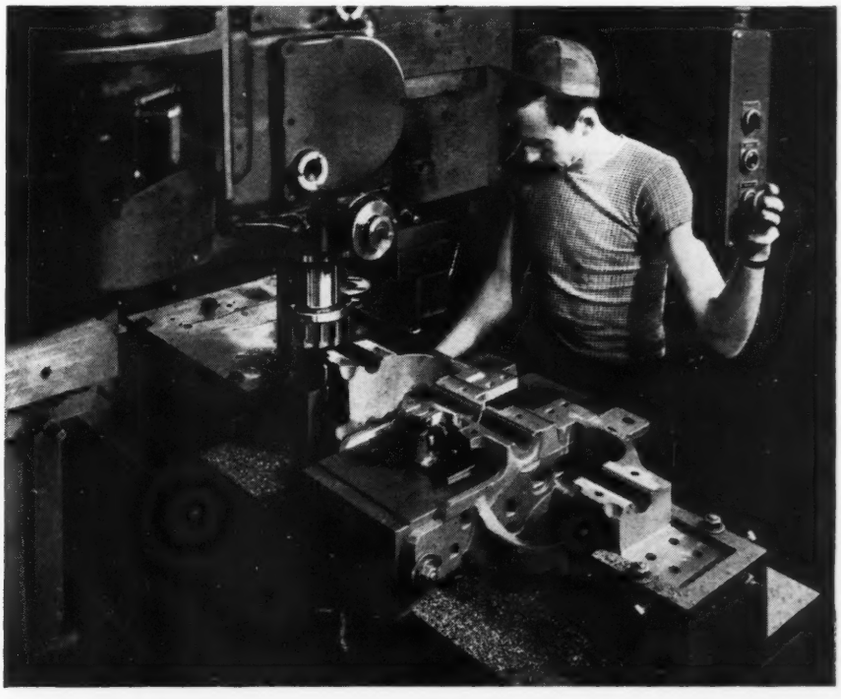


Fig. 2. A double milling cutter is employed for facing and recessing two girt-end castings in one set-up

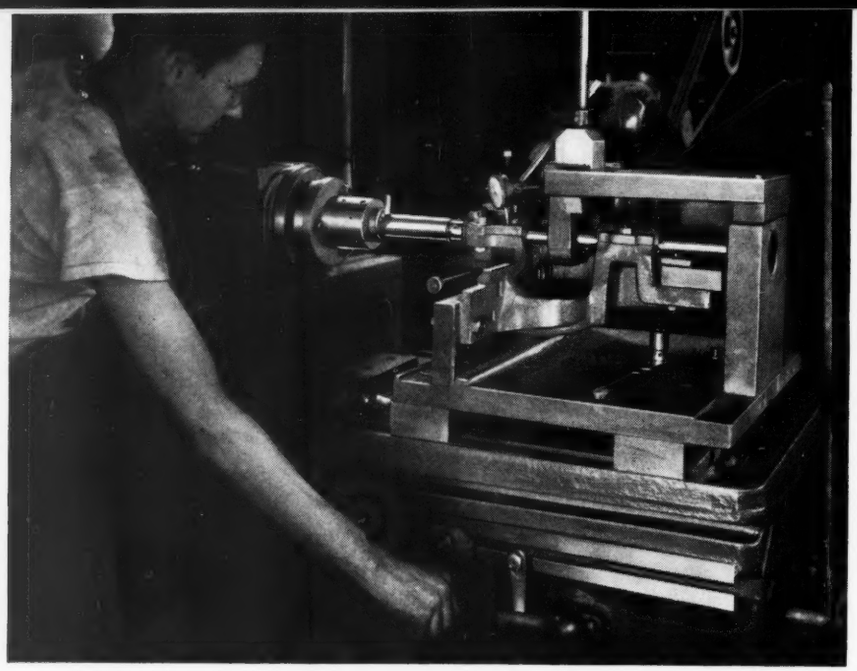


Fig. 3. A special fixture containing bearings for supporting the long boring-bar is employed to insure proper alignment of the shaft to be mounted in this casting

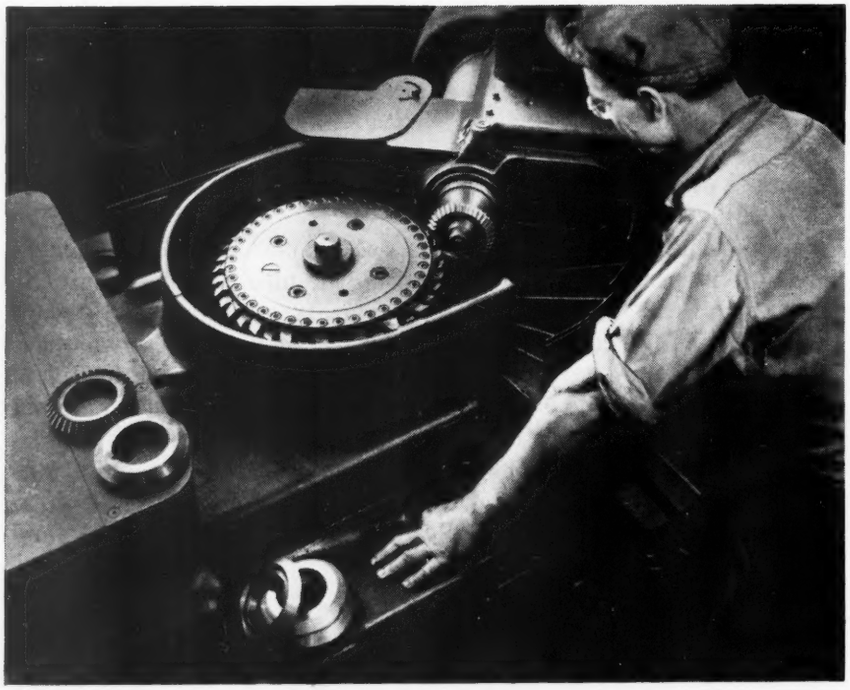


Fig. 4. Teeth on the bevel gears for textile-loom take-up shafts are cut at the rate of five seconds per tooth on this machine. A blank and a completed gear are shown at the left

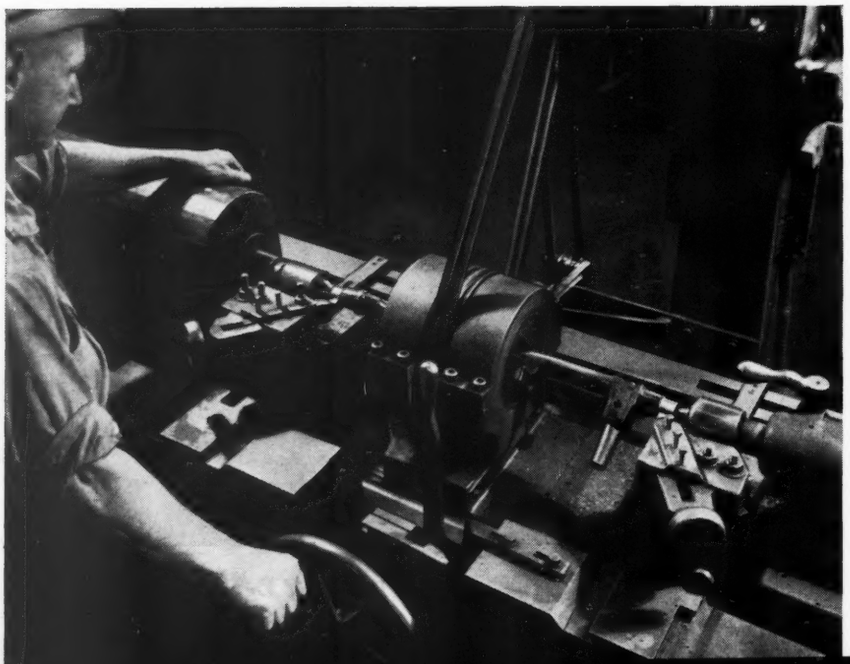


Fig. 5. The tapered bearing seats on both ends of a pick-shaft are machined simultaneously on an engine lathe equipped with two independent cross-slides, one lead-screw, and two taper attachments

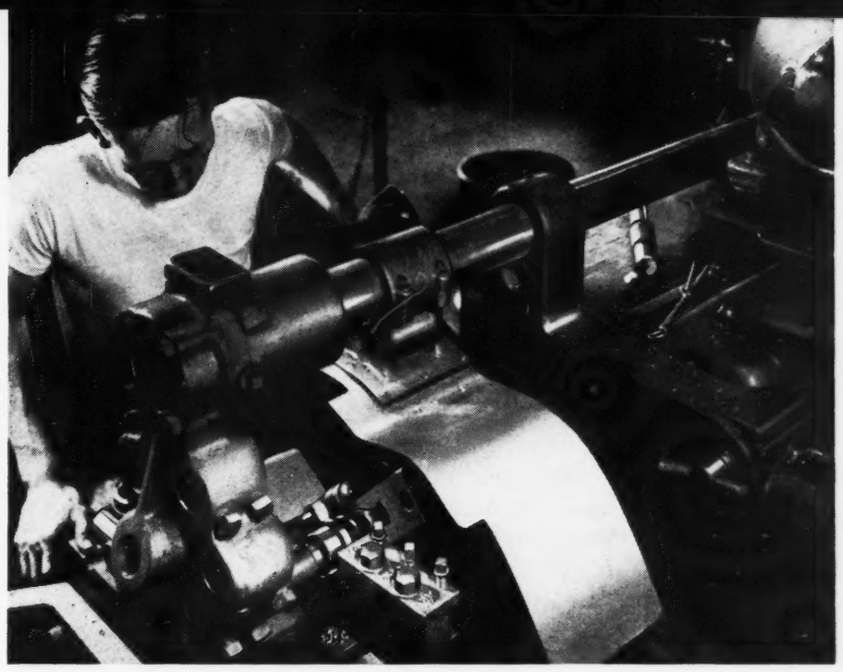


Fig. 6. "Down time" required for changing tools is eliminated and indexing time is minimized by providing three sets of identical tools on the six turret positions of this machine

thread on one end and a left-hand thread on the opposite end. Two independent taper attachments are also provided at the back of the lathe.

For the taper-turning operation, the pick-shaft is held between the lathe centers, and is supported at the middle by driving lugs or dogs mounted in the belt-driven hollow spindle. The vertical lever seen directly behind the handwheel is used to reverse the rotation of the lead-screw and return the cutting tools to their original positions.

In the set-up on the Foster "Fastermatic" illustrated in Fig. 6, only two of the six turret positions are required for facing, boring, turning, chamfering, and reaming the malleable-iron cam hub shown. However, all six turret positions are utilized by providing three identical sets of tools. This eliminates the "down time" required for changing tools, since some of the tools can be changed while others are cutting. Also, the indexing is reduced to a minimum, since there are no idle turret positions.

The cam hub is held in a two-jaw air chuck. Facing, boring, turning, and chamfering are accomplished with single-point carbide-tipped tools mounted on the turret and cross-slides. These operations are performed with a work speed of 277 R.P.M. and a tool feed of 0.018 inch per revolution. About 1/16 inch of stock is removed from each surface of the part. In the reaming operation, a carbide-tipped tool, with a feed of 0.030 inch per revolution, removes 0.005 inch from the bore of the cam hub. The work speed is automatically reduced to 151 R.P.M. during this operation. Each part is completed in a cutting cycle of 1 minute and 15 seconds.

Thickness of Moving Sheets Accurately Measured by X-Rays

THE Westinghouse X-ray thickness gage, which is used to measure the thickness of sheet steel on processing lines, or other moving sheet materials, has recently been redesigned to improve its flexibility and ease of operation. Thickness is measured by comparing the intensity of X-rays when passing through a standard and when passing through the sheet being processed. The accuracy of measurement is limited by the accuracy of the standard. Formerly, the standard consisted of a small measured sheet inserted in front of the reference X-ray tube. With the new gage, a standard of any thickness between 0.005 and 0.1199 inch can be selected in steps of 0.0001 inch.

By adjusting illuminated dials, a motor-driven turret is rotated, which sets the desired thickness. This eliminates manual changing of standards. Accuracy of the standard is 1 per cent, which is generally close enough for most production purposes. To insure maximum accuracy, the output intensities of the gaging and of the reference X-ray tubes are equalized before a production run. The reading is not affected by changes in the speed at which the sheet passes the gage. The control can be connected to adjust the mill screw-downs automatically for correcting errors in thickness or to operate reject flaps that segregate sheets of steel whose thickness does not come within the required tolerance.

Engineering News

Huge Compressor Constructed for High-Speed Wind Tunnel

An axial compressor that generates an air flow up to 870,000 cubic feet per minute has been designed and built by the Allis Chalmers Mfg. Co. in conjunction with engineers of the National Committee for Aeronautics. The compressor is being used for a 4- by 4-foot wind tunnel at the Langley Aeronautical Laboratory in Virginia for the study of flight at speeds faster than sound.

The compressor, which has seven stages and 1137 blades, requires up to 60,000 H.P. to drive it. It circulates air through the tunnel at velocities ranging from 1.2 to 2.2 times the speed of sound. The rotor weighs 65 tons, and the entire compressor 140 tons.

New Drive Provides Adjustable Constant Speed

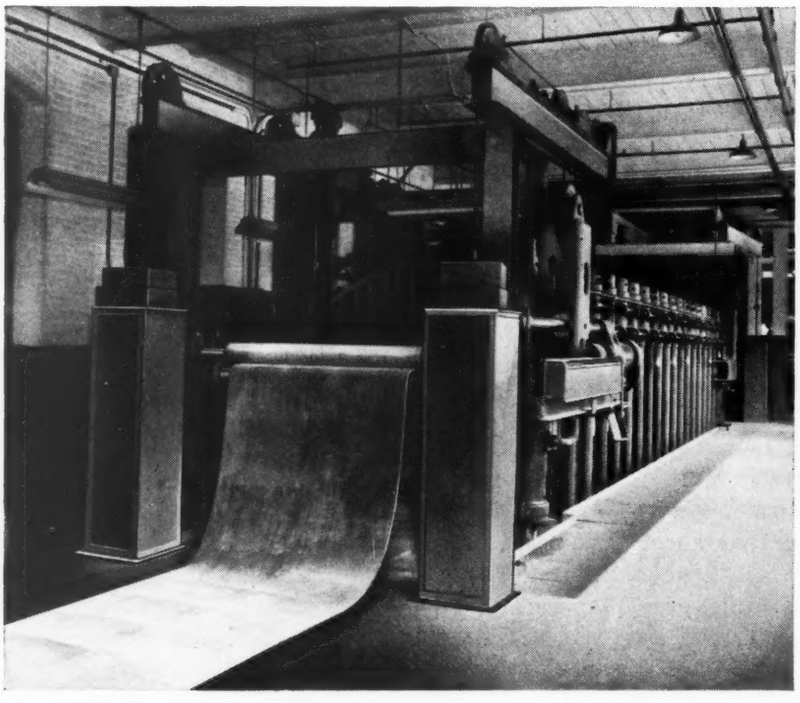
The speed of many industrial machines is required to be adjustable, but when once set, must be maintained as constant as possible. A new type of regulating drive provides such an adjustable, constant characteristic, maintaining the speed within an accuracy of plus or minus 0.1 per cent, regardless of changes in temperature, load, supply voltage, or other conditions.

This drive is applicable to a variety of processes that require accurate regulation of speed for a long period of time. In one case, it is used to regulate simultaneously more than a hundred small motors over a speed range of 6 to 1. The speeds of the motors are adjusted by changing the input frequencies. Power for all the motors is supplied by a single adjustable-frequency system consisting of an adjustable-speed motor-generator set (converting direct to alternating current) which, in turn, is supplied by a constant-speed adjustable-voltage motor-generator set (converting alternating to direct current). The speed of the motors is, of course, determined by the speed of the alternating-current generator. —*Westinghouse Engineer*

Cold Pressure Welding of Non-Ferrous Metals

A method of welding non-ferrous metals at room temperature has been developed by the General Electric Co., Ltd., of England. The most important application of this process up to the present time is in the cold-welding of aluminum.

With this material, it is essential to prepare the surfaces to be joined by removing all traces of oxide film. The application of pressure to these surfaces by means of tools shaped to direct the



Huge hydraulic press built by the Baldwin Locomotive Works for vulcanizing conveyor belts under controlled pressure and temperature in the Passaic, N. J., factory of the Manhattan Rubber Division, Raybestos-Manhattan, Inc. The assembled press weighs approximately 320 tons, one of the 40-foot platens alone weighing 45 tons. Eight individual control systems maintain the proper temperature during the vulcanizing process, there being less than 2 degrees variation in temperature over any one platen surface, in spite of sudden and large load changes and a surface area equal in size to that of a bowling alley

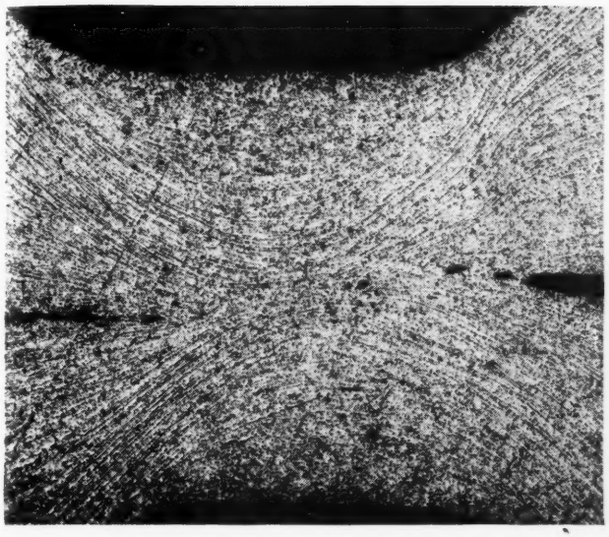


Fig. 1. A micro-section of a typical cold pressure weld in aluminum, showing lines of flow

flow of metal away from the welding point produces the results shown in the photomicrograph, Fig. 1. Although joint strength data are not available at present, it is said that the rate of application of pressure does not appear to affect the strength of the weld, good welds being produced by either a slow squeeze or by impact.

Three different techniques have been evolved —straight welding, ring welding, and continuous seam welding. The ring weld can be used for sealing the ends of flanged tubes, joining disks to form an air-pressure cell, and similar operations. Among the important applications of the seam weld are tube-making and cable-sheathing.

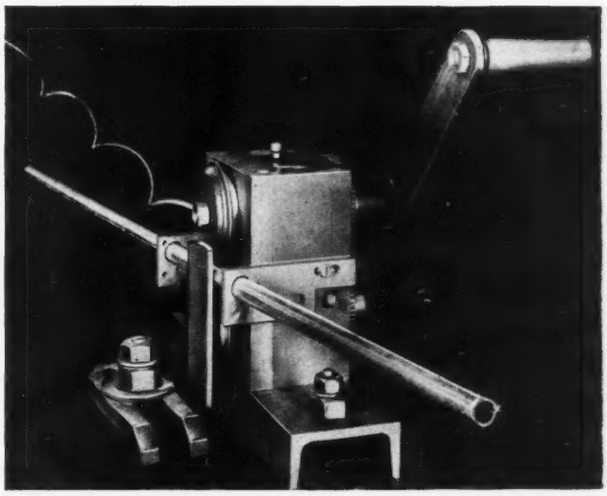
A machine has been constructed that automatically scratch-brushes the surfaces of aluminum strip to remove the oxide film, and then forms, welds, and trims the work continuously. Fig. 2 shows this machine welding a piece of aluminum tubing.

The process described is controlled in the United States by the Koldweld Corporation, of New York City.

Moving Stairways to be Installed on U. S. Navy Aircraft Carriers

The first moving stairways to be used aboard a warship will be installed on three U. S. Navy aircraft carriers of the Essex class by the Westinghouse Elevator Division, Jersey City, N. J. They will be capable of transporting thirty Navy jet pilots a minute from the hangar deck up to the flight deck 28 feet above. Since the pilots must carry more than forty pounds in clothing and equipment, these stairways will be a considerable aid.

Fig. 2. A continuous seam weld is produced in aluminum stock on this machine by means of pressure from two rollers. The machine also scratch-brushes, forms, and trims the work



A sliding support at the lower end will permit an adjustment of 1/2 inch of the stairways to compensate for such strains as are caused by heavy seas, concussion, or varying temperature conditions. Step treads on the stairways will be made of Micarta plastic, and the side railing will be steel. To withstand shock, cast steel has been substituted for cast iron in the driving machinery and bronze is replacing aluminum in the step brackets.

Special Oil Developed to Cool the Magnet Coils of a Cyclotron

A specially developed oil, circulating at about 600 gallons per minute, will be used to cool the two giant 90-ton magnet coils of the 400,000,000 electron-volt syncro-cyclotron being constructed for the Carnegie Institute of Technology. This "cyclotron oil" permits direct-contact cooling of the copper magnet coils, enabling them to be wound more closely. Although the magnet is one of the most powerful in the world, it is about one-third smaller than others of similar capacity.

The new oil was developed by the Gulf Corporation and donated by the company for use in the cyclotron project. It will carry off heat from cooling channels as narrow as 1/16 inch between the coil windings. An elaborate circulating system will pump oil through 24,000 channels in the coils and thence to a heat exchanger. In this cycle, about 1,300,000 B.T.U.'s of heat—dissipated each hour by the magnet coils—will be carried off continuously. Nine hundred gallons of oil are needed to fill the system to capacity. The oil acts primarily as a cooling agent, and has no lubricating function.

Annual Convention of National Tool and Die Manufacturers

THE National Tool and Die Manufacturers Association held its annual convention in New York City from October 30 through November 2. The outlook for the industry and various problems confronting tool and die manufacturers were considered. Centre W. Holmberg, newly elected president of the Association, pointed out two important factors that indicated a rise in the tool and die business. First, in the increasing competition of the buyers' market, new models of products, especially in the household appliance field, must be introduced soon. This is impossible without the tailor-made dies, molds, and other special tools supplied by the tool and die industry. Second, with a constantly growing pressure to reduce the cost of production, greater and greater dependence will be placed on better and more elaborate tooling up for the job. This offers the most practical way of keeping costs down.

Paul R. Hatch, sales director for the Brown & Sharpe Mfg. Co., Providence, R. I., emphasized the need for cooperative selling. He said that most tool and die manufacturers have stressed engineering, manufacturing techniques, etc., when they should be strengthening their sales policies. Mr. Hatch proposed a sales program for the Association that would include the training of sales personnel in the specific problems of selling tools and dies.

Another highlight of the convention was the address by E. Slater, of Slater & Crabtree, Ltd., Wakefield, England, a member of the British Tool and Gage Makers Association, who compared the tool and die industries here and in England. According to Mr. Slater, American tool and die shops are twenty years ahead of comparable British shops. On the other hand, he pointed out that the British are more advanced than American shops in export selling and in making tools for deep stamping work.

Two panel discussions were held at the general sessions of the convention, one dealing with "Business Problems of Tool and Die Manufacturers," and the other with "Employer-Employe Relations." At the first discussion meeting, Alexander W. Luce, head of the Mechanical Engineering Department of Pratt Institute, served as moderator, while at the second meeting, John S. Higgins, president and general manager of the Whittet-Higgins Co., presided.

Officers of the Association for the coming year were elected as follows: President, Centre W. Holmberg, president of August W. Holmberg Co., Inc., New York City; first vice-president, Herbert F. Jahn, president of the B. Jahn Mfg. Co., New Britain, Conn.; second vice-president, R. H. Cope, manager of the Bunell Machine & Tool Co., Cleveland, Ohio; secretary, Alfred Reinke, president of Gus Reinke Machinery & Tool Co., Hillside, N. J.; and treasurer, Herbert Harig, vice-president and treasurer of the Harig Mfg. Corporation, Chicago, Ill. George S. Eaton will continue as executive secretary. The headquarters of the Association are in the Union Commerce Bldg., Cleveland.

New officers of the National Tool and Die Manufacturers Association. (Seated, left to right) Herbert F. Jahn, first vice-president; Centre W. Holmberg, president; and R. H. Cope, second vice-president. (Standing) Alfred Reinke, secretary; and Herbert Harig, treasurer

A Machine that Helps to Make Its Own Dies

By CYRIL J. BATH
President, Cyril Bath Co.
Cleveland, Ohio

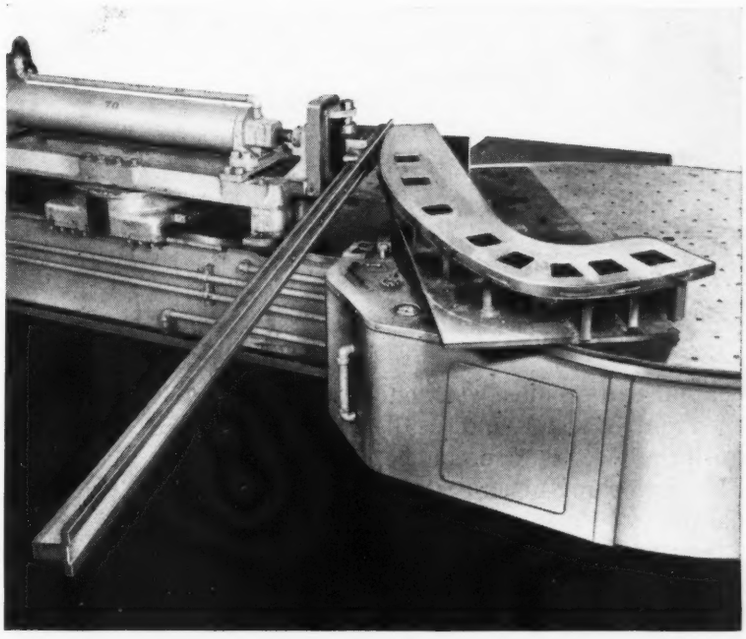


Fig. 1. Bath contour former with die mounting block in place on the table and a straight bar of the required cross-section for the curved die member held in position for the hydraulic die-head to apply pressure on it when the table is revolved

CURVED steel shapes for a large variety of applications can be produced on the contour former, a machine that was developed by the Cyril Bath Co. primarily to meet requirements in aircraft manufacture during the war period. Since the war, the machine has been used for turning out work in plants producing railroad coaches, busses, trucks, trolleys, agricultural equipment, printing presses, and many other products. The machine is designed to serve as companion equipment to the press brake. The press brake can turn out straight shapes of required cross-sections, and the contour former can curve them into roof carlines for railroad cars, bus bumpers, and so on.

An unusual feature of this machine is that it can be used to produce the accurate forming element of its own dies, which makes possible a substantial reduction in the original cost of the dies and eliminates the expensive reworking of dies, frequently necessary with previous methods.

The importance of this feature of the machine will be realized when it is considered that every shape to be formed must either be stretched or compressed on a form die. Although the form die is less expensive than the matched dies required in conventional press operations, it ordinarily costs enough to be an important factor in the moderate production of large parts. This is particularly true in working with stainless steel or other high alloys because the amount of springback in the work under pressure is an incalculable factor that depends on the shape of the cross-section and the nature of the material. The form die must be made to compensate for varying degrees of springback.

Any form die that is machined to the desired

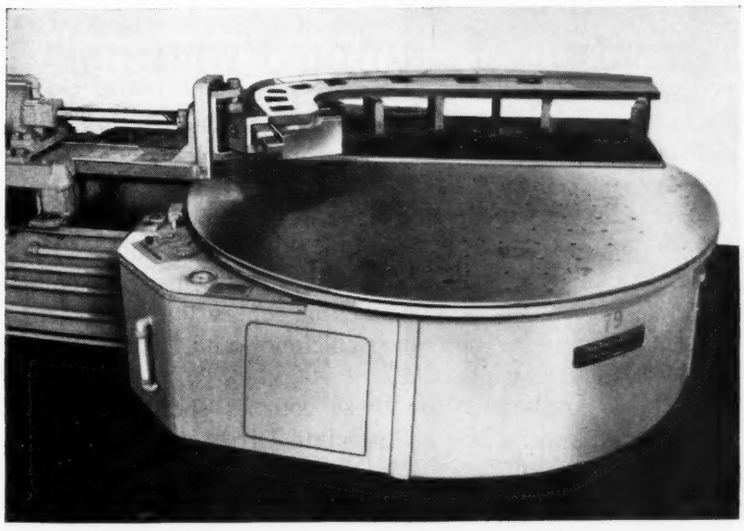


Fig. 2. View of the contour former in Fig. 1 after the curved die member has been completely wrapped around the mounting block, the operation having been performed by a rotary movement of the machine table

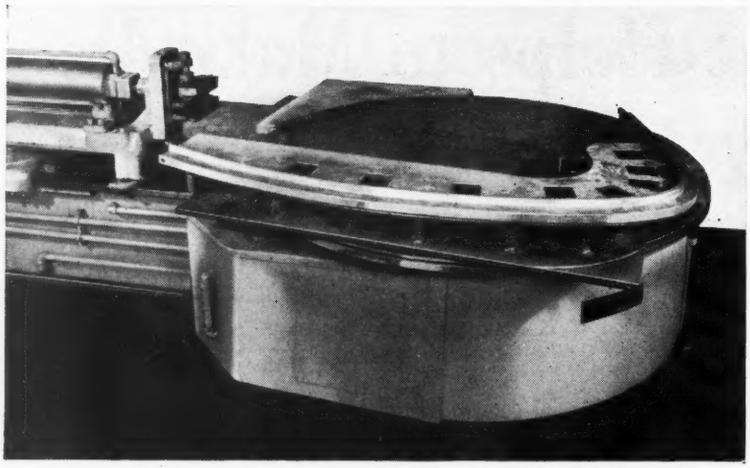


Fig. 3. The completed form die ready for test forming to check springback in the finished product. Adjustments for regulating the springback are made by means of screws or wedges

contour can produce work only to approximately the required shape, and the die must be reworked until the piece is made to the accuracy required. This reworking often costs more than the original die.

As the result of considerable experience, a form die has been developed for use on the contour former, which consists of two essential parts. These parts comprise a welded mounting block, which is bolted to the machine table and which is oxygen-cut along the top edge to approximately the desired contour of the work, and a second piece consisting of a steel bar which is curved to the exact final contour of the work. The second piece is made from a straight steel bar, which is first planed along one side to conform to the shape of the inside cross-section of the work to be formed in the die and then wrapped around the curved edge of the mounting block by applying the power of the contour former itself.

When formed, the planed bar is fastened to the mounting block in such a way that it can be sprung in or out by the use of screws or wedges, so as to compensate for variations in springback of the work. A secondary method of making correction, which is used when distortion appears in the cross-section of the formed bar, is to remachine the die member on the contour former with a turning tool mounted on the hydraulic head. Hydraulic pressure keeps the cutting tool in contact with the form die, while suitably mounted rollers or shoes cause the head to follow the die shape.

The beginning of an operation of curving the die member is shown in Fig. 1, where a straight bar of the required cross-section is mounted in position for the hydraulic head to apply pressure as the table revolves and curve the bar around the mounting block. Fig. 2 shows the end of the curving operation, after the die bar has been fully wrapped around the mounting block. The completed die is shown in Fig. 3, the accurately curved member being anchored to the mounting block by means of adjusting screws. These screws provide means of adjusting the bar inward or outward to compensate for springback in the work.

Machine Tool Familiarization Training Programs

THE fifth in a series of nine-day machine tool familiarization training programs will be given at the Rochester Institute of Technology from January 18 to 27, inclusive. This program is designed to acquaint sales or service engineers, manufacturers' agents, and tool or accessory salesmen with the equipment used by the manufacturers who buy their products. Through demonstrations, actual operation, and discussion of machine shop equipment and methods, it is intended that participants will acquire the vocabulary, shop knowledge, and general understanding of machine and tooling problems.

There will also be a five-day cam design and tool selection clinic, beginning February 20, for process and tool engineers, estimators, cam and lay-out designers, and plant and department supervisors of screw machine companies. This course is designed primarily for men of experience in screw machine operation, and will emphasize increased efficiency and lower manufacturing costs.

Applicants for these courses should address Alfred L. Davis, Associate Director of the Evening and Extension Division, Rochester Institute of Technology, Rochester, N. Y.

Economical Tooling for Short Runs Stressed at Tool Engineers' Meeting

TECHNICAL papers of unusually high quality and variety and an exceptionally good attendance were features of the seventeenth semi-annual meeting of the American Society of Tool Engineers, held October 27 to 29, inclusive, in the Mount Royal Hotel, Montreal, Canada. At the reception luncheon on the opening day, greetings were extended by Mayor Camillien Houde, after which V. M. Drury, president of the Canadian Car & Foundry Co., Ltd., stressed the great amount of business that has existed between Canadian and American manufacturers during the past, and pointed out that British industrialists at present are planning to develop competition greatly in the Canadian markets.

The principal speaker at the semi-annual dinner was the Right Honorable Clarence D. Howe, Minister of Reconstruction and Supply and Minister of Trade and Commerce, who paid tribute to the Society members as the men who have equipped Canadian as well as American industry with the best tools in the world.

In his paper "Hot-Spot Machining," Sam Tour, chairman of the board, Sam Tour & Co., Inc., New York, explained that when the hot-spot machining process is applied to ordinary steels and other hard metals, the output per machine and man-hour can be increased 200 to 300 per cent. The process consists of electrically heating the surface of a part being machined, just ahead of the tool that cuts the part to shape. This so reduces the hardness of the steel that vast increases in machining speeds are possible.

Successful experimental production has been performed on extremely hard materials that are ordinarily considered unmachinable, according to Mr. Tour. Temperatures up to 1500 degrees F. are applied to the surface of the material being cut, while the inside of the part remains cold.

Another comprehensive paper dealing with this subject, entitled "Milling Hot Work-Pieces," was presented by A. O. Schmidt, research engineer of the Kearney & Trecker Corporation, and J. R. Roubik, lecturer in mechanics at Marquette University and also associated with the Kearney & Trecker research department.

This paper outlined four different ways to machine heated work-pieces as follows: (1) Preheating the work-piece in a furnace and then machining it, the holding device being insulated or cooled so that not too much of the heat is transmitted to the machine tool; (2) machining work-pieces while they are still hot from other manufacturing processes—for example, steel billets from a rolling mill and forgings or castings before they have cooled to room temperature; (3) heating the work-pieces on a machine

The Right Honorable C. D. Howe, Minister of Reconstruction and Supply and Minister of Trade and Commerce in the Government of Canada, addressing the American Society of Tool Engineers at the semi-annual dinner in Montreal. Harry E. Conrad, executive secretary of the A.S.T.E., is seen at the left and Robert B. Douglas, president of the Society, at the right

tool either by the induction process or with gas immediately before the cutting operation; and (4) surface heating the work-piece on the machine for milling plane surfaces. In this operation, the heat is applied to the top layer of the material, and the machined surface is thus relatively unaffected by the heat.

Ways of avoiding high tool temperatures were discussed, and specific operations were described in which data was presented concerning the type of cutter, depth of cut, feed, cutting speed, etc.

Mold die hobbing was the subject of a paper presented by Islyn Thomas, president of the Thomas Mfg. Corporation, and Edmund W. Spitzig, hobbing supervisor of the Newark Die Co., while mold finishing was discussed in a paper presented by M. C. Overholt, general superintendent of tool production, Peerless Engineering Ltd. The application of tool standards to reduce costs was considered in a paper by W. A. Thomas, superintendent of tool engineering, Ford Motor Co. of Canada, Ltd.

Surface measurement was discussed in an important evening session, during which the following papers were read: "A New Concept of Surface Measurement," by Gerald A. Rogers, Rudel Machinery Co., Ltd., Montreal; "Surface Finish Control and the Making of Master Standards," by Arthur F. Underwood and Roy P. Trowbridge, Research Laboratories Division, General Motors Corporation; and the "Calibration of Master Roughness Standards and Their Use," by Dr. Clayton R. Lewis, staff research engineer of the Chrysler Corporation.

The topic "Low-Cost Tooling—Estimating and Economics" was divided into two sections: Predesign estimating was discussed in a paper by G. M. Foster, assistant superintendent of machine and tool design, Northern Electric Co., Ltd., Telephone Division, while post-design estimating was treated in a paper by G. S. Clarke, assistant superintendent of the machine and tool shop, of the same company. Reduction of die costs through the use of low melting point alloys was considered by C. H. Smith, branch manager of the Canada Metal Co., Ltd. The development of special-purpose machines from standard units was described by C. P. Farr, chief engineer, Modern Tool Works, Ltd.

In the course of an interesting symposium on limited production, the economics of limited production were discussed by E. P. Blanchard, general sales manager of the Bullard Co.; tools, materials, and methods for limited production were considered by J. B. Savits, methods manager, Pneumatic Scale Corporation, Ltd.; and quality control of limited production formed the subject of a paper by C. D. Wright, chief engineer, Reliable Toy Co., Ltd. "Statistical Quality Control" was the topic of a paper by J. K. MacKeigan, chief engineer, Tire Division, Dunlop Tire & Rubber Goods Co.

Semi-Annual Meeting of Gear Manufacturers

THE 1949 semi-annual meeting of the American Gear Manufacturers Association, held at the Edgewater Beach Hotel, Chicago, Ill., October 24 to 26, inclusive, was marked by important technical sessions and committee meetings. An unusually comprehensive paper on the subject of "pre-shave" gear-cutting tools was presented by A. D. Moncrieff, assistant chief engineer, Michigan Tool Co., Detroit, Mich. Mr. Moncrieff explained that when gears cut by hobbing, shaping, or the "Shear Speed" method are to be shaved, it is desirable that "pre-shave" tools be used in the preliminary operation rather than standard tools. The difference between a "pre-shave" tool and a standard tool is that the former is designed to take into account the location and the amount of stock to be removed by shaving, and thus insures a smoothly blended tooth profile.

The design of the "pre-shave" tool varies according to the number of teeth in the gear, the diametral pitch, and the pressure angle. The smaller the number of teeth, the more the undercut produced by a standard tool. Diametral pitch controls the amount of tool modification required to provide clearance for the shaving cutter. The pressure angle determines the location and amount of tool modification. Mr. Moncrieff illustrated his paper with many slides showing "pre-shave" cutting tools for hobbing, shaping, and "Shear Speed" machines.

In a paper entitled "Gear Testing Methods for the Development of Heavy-Duty Gearing," R. P. Van Zandt and B. W. Kelley, Caterpillar Tractor Co., Peoria, Ill., pointed out various factors which necessitate heavy-duty gearing on tractors, of considerably different design from that used in automotive practice. Then followed a description of a number of testing machines developed in the Caterpillar laboratories, and a detailed account of testing procedures.

The speaker at the semi-annual dinner was Warren Whitney, vice-president of James B. Clow & Son, who is also vice-president of the National Association of Manufacturers.

Machine Tool Distributors Hold Twenty-Fifth Annual Meeting

THE American Machine Tool Distributors' Association held its twenty-fifth annual meeting at the Hotel Gibson, Cincinnati, Ohio, October 30 to November 1. The meeting was presided over by Robert L. Giebel of Giebel, Inc., New York City, who has served as president for the past year. O. W. Johaning of the Colcord-Wright Machinery & Supply Co., St. Louis, Mo., was elected president for the coming year.

O. W. Johaning, new president of the American Machine Tool Distributors' Assocation

The American Machine Tool Distributors' Association was conceived in 1924 by the executives of twelve of the leading machine tool distributors in the United States. The first official meeting was held on January 12, 1925. The Association was founded to establish understanding of the requirements of the industry and to promote a closer relationship between builders, distributors, and users of machine tools. Since the first meeting, two conventions have been held yearly, at which current problems of the industry are discussed and suggestions made toward attaining the objectives of the Association, which may be briefly stated as follows:

1. To render to industry, through organizations comprising technically skilled men, sound counsel concerning processes of manufacture and the necessary machine tools required for these processes.

2. To provide the builders of machine tools with engineering information concerning the immediate and future requirements of industry.

3. To establish a better and clearer understanding of the requirements of the machine tool trade, in order to improve its ethics and maintain them on a high plane.

At the meetings held October 30 and 31, association matters were discussed. At the meeting held Tuesday, November 1, five addresses were made. E. J. Seifreat, of the Seifreat-Elstad Machinery Co., Dayton, Ohio, presented the report of the Sales and Service Committee, in which he outlined the sales courses that have been arranged in conjunction with the National Machine Tool Builders' Association. Tell Berna, general manager of that Association, dealt further with this subject and also covered other matters of mutual interest to dealers and builders of machine tools.

An instructive paper entitled "How to Read Your Customers' Financial Statements" was presented by Fred C. Dennis of Lybrand, Ross Bros. & Montgomery, Cincinnati, Ohio, while the subject of "Advertising" was dealt with in an address by William K. Beard, vice-president of the McGraw-Hill Publishing Co., New York City. Finally, the topic of public relations and their importance in industry today was covered by William A. A. Castellini, vice-president of Dinerman & Co., Cincinnati, Ohio.

At the annual dinner, A. G. Bryant, president of the Bryant Machinery & Engineering Co., Chicago, Ill., acting as toastmaster, presented certificates to the founder members of the Association. On this occasion, the Honorable Robert A. Taft, United States Senator from Ohio, delivered a very constructive address on the subject "How Can We Maintain Capital Investment." Senator Taft pointed out the necessity for encouraging investment in industry if we are to maintain our industrial supremacy, and emphasized the fact that when taxes are raised beyond a certain point, industrial investments are definitely discouraged, and further progress of industry is severely curtailed.

* * *

Techniques that will enable a nodular graphite Meehanite metal to be produced on a commercial scale have been announced by the Meehanite Metal Corporation. This is the result of recent work by metallurgists of the company, who have developed a new process of making nodular castings, including means of treatment that assure accurate control of the physical properties.

Accurate Method of Measuring Dovetails

By L. F. WILHARM

THE most accurate method of measuring a tapered part is by the use of a sine bar and precision gage-blocks. A method of measuring dovetails based on the sine-bar principle of measuring angles is described in this article. Fig. 1 shows how this is done. Details of the tool used for measuring dovetails are illustrated in Fig. 2. In making such tools, care must be taken to have the axis of the V-groove in the pin-holding members parallel with surface *A* and also at exactly 90 degrees with surface *B*, in order to insure the necessary accuracy when measuring across the pins, as shown in Fig. 1. It will be noted that surfaces *A* and *B* form a seat for the measuring pins, different sizes of which can be readily substituted by merely using a screwdriver.

This tool provides a means of determining the dimension across the points of intersection of the tapered sides of a dovetail with the connecting plane surface when the angle of taper is known or it can be applied for finding the angle of taper when the dimension across the points of intersection can be measured exactly. Data Sheets Nos. 647 and 648 of this issue of MACHINERY and 649 and 650 (to be published in the January number) have been prepared to facilitate the use of the tool, employing 1/2-inch diameter pins.

Two conditions encountered in making dovetail measurements are illustrated in Data Sheet 647. Depending on these conditions, the tabulated value *X* (Data Sheet 648) to be applied for a given angle is either added to or subtracted from the reading over or between the pins. For example, suppose the dovetail angle is 1 degree 30 minutes and it is required to find the dimension *C* at the inside intersection of the tapered sides with the plane surface, as shown in the left-hand sketch. By referring to Data Sheet 648, we find that for this angle the dimension *X* to be added to the dimension *A* measured between the pins is 0.9871 inch.

When it is required to find the dimension *C* for the same angle by measuring over the pins across the outside of the intersection of the two tapered sides with the plane surface, as shown in the right-hand sketch, 0.9871 inch is subtracted from the dimension *A* measured over the pins.

In the event that the angle on one side of a tapered dovetail differs from the angle on the other side, use the tabulated value of *X* that corresponds to one-half the sum of the two specified angles.

To determine the value of *X* when pins of other diameters than 1/2 inch are used, multiply the tabulated values of *X* by a factor obtained by dividing the radius of the required pin by the radius of a 1/2-inch diameter pin. For example, when a 5-degree angle of taper is being measured

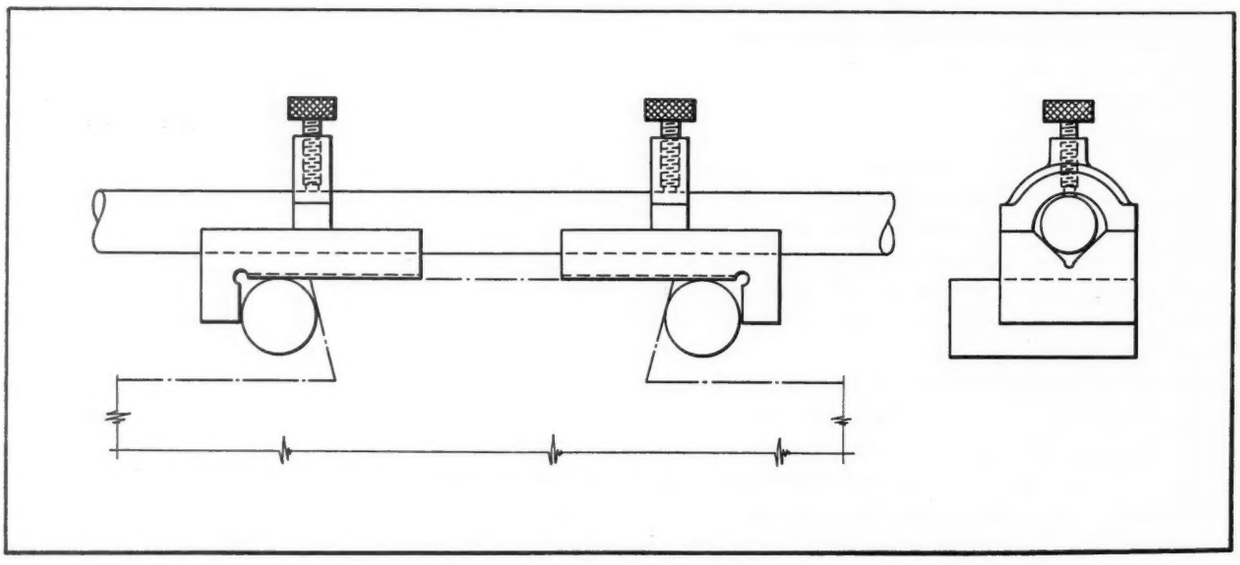


Fig. 1. This tool, based on the sine-bar method of measuring angles, provides a simple means of accurately measuring dovetails

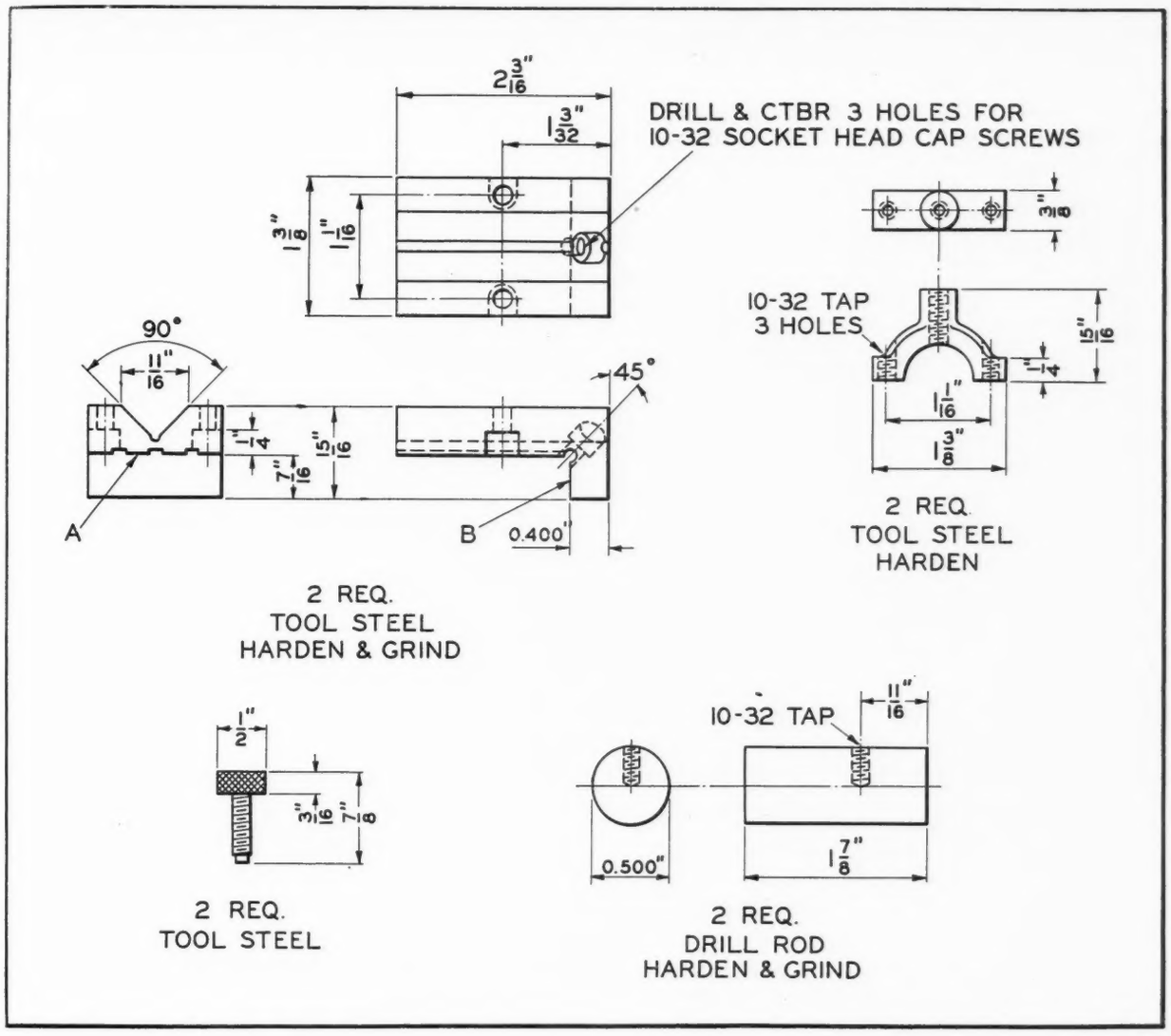


Fig. 2. Constructional details of a tool designed for measuring dovetails

with 1/2-inch diameter pins, it will be seen from Data Sheet 648 that the corresponding value of X is 0.9580. If the same taper is to be measured with 3/4-inch diameter pins, the value of X is found by multiplying 0.9580 by $0.375 \div 0.250$, or $0.9580 \times 1.5 = 1.437$.

Two other conditions often encountered in making dovetail measurements will be illustrated in the Data Sheet to be published in January MACHINERY, and the corresponding values for X will be given.

* * *

Six mobile machine shops outfitted for repairing agricultural equipment will be supplied to Turkey with Marshall Plan dollars. During the harvest season these shops will be moved about as required. In winter, they will be stationed in central localities for making major repairs and to serve as training centers for farmers.

Educational Films on Carbide Tool Practice

A kit containing a set of six educational discussion type slide films covering carbide single-point tool practice is available from the Carboloy Company, Inc., Detroit, Mich. The films are based on the information contained in the company's recently released carbide tool manual. The subjects covered are: What is Cemented Carbide?; Designing Single-Point Carboloy Tools; Brazing Carboloy Tools; Designing and Grinding Chip-Breakers in Carboloy Tools; Grinding Single-Point Carboloy Tools; and Application of Carboloy Tools and "Trouble Shooting." Included in the kit are six booklets supplementing material presented in the films, as well as a booklet giving instructions for obtaining the best results in using the slide films for group instruction. Information regarding price of kit and other details can be obtained from the company.

Rotary Tables Increase Flexibility and Milling

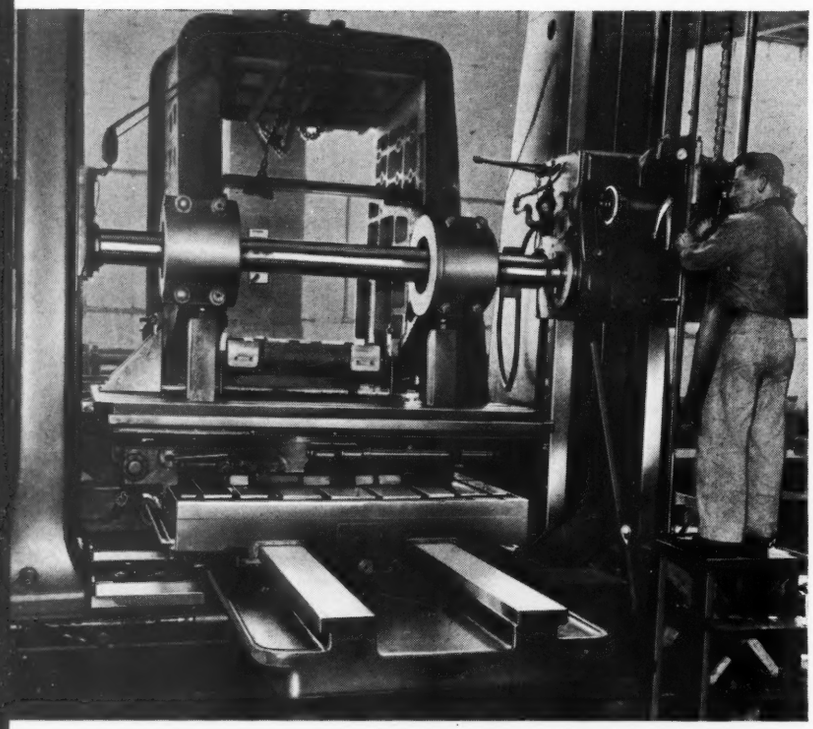


Fig. 1. Two bearing holes are simultaneously bored by means of this set-up. The huge casting is mounted on the rotary table of a horizontal boring, drilling, and milling machine

Fig. 2. A machine tool column is milled, drilled, and tapped on all sides in one set-up

THE tooling potential of horizontal boring, drilling, and milling machines is often overlooked because it is difficult to visualize various movements and combinations of movements possible with work and tool. By the effective application of different accessories and attachments, either used separately or in combination, work settings can often be reduced to a minimum and more work accomplished in a given set-up. Examples of such applications on Giddings & Lewis machines are described in the following.

The over-all time for machining a huge crusher-frame casting was reduced from 105 to 51 hours with the set-up shown in Fig. 1. By employing a standard rotary table and an angular milling attachment, all the boring, milling, facing, drilling, and tapping operations are performed on this machine in one set-up.

Three extra set-ups of the irregular-shaped heavy casting have been eliminated, and the work is accurately positioned during the machining sequence by means of the rotary table. Thus considerable time is saved, and true alignment of the bore centers and side faces is obtained with respect to the bearing-cap seats.

The machining sequence consists of milling the bearing-cap seats, drilling and tapping eight bearing stud holes, milling the pads, and drilling and tapping six pad holes. The caps are then assembled, the rotary table is indexed through an angle of 90 degrees to the position shown, and the line boring-bar is installed.

Block cutters are accurately spaced in the boring-bar, so that both bearing bores can be machined simultaneously. Time is further saved by the use of interchangeable block type cutters, as this eliminates the need for adjustments being made by the operator. Cutter-blocks are received from the tool-room ready to successively rough-, semi-finish, and finish-bore to the specified diameters. The blocks are simply inserted in slots in the boring-bar, and are secured by means of tapered lock-screws, which center the cutters. The two steps in both bearings—10.250 and 7.625 inches in diameter, respectively—are held within a tolerance of 0.001 inch.

# of Horizontal Boring, Drilling, Machines

After removing the line boring-bar, eight 1 5/8-inch diameter holes are drilled and tapped in the outside face of both bearings. It is, of course, necessary to index the table 180 degrees to complete this operation. The table is then indexed 90 more degrees and an angular milling attachment is mounted on the headstock of the machine. This permits the milling of internal ribs which provide bearing surfaces for liners. In some instances, because of the difficulty of reaching such internal surfaces, liner bearing surfaces may be left in the rough cast condition or inaccurately finished with portable grinders.

Faced with the need for doubling the production of machine tool columns, one manufacturer reduced the machining time from fifteen to seven and one-half hours per column by adopting the method shown in Fig. 2. Previously, full-time operation of three different machine tools was required to produce fifty columns per month. Also, inaccuracies resulted from this method because it was necessary to move the work from machine to machine and reset it each time it was moved.

Now, the top, front, rear, and bottom of the column are milled, drilled, tapped, and slotted in one set-up. This method permits following the recommended machining practice of performing all roughing operations prior to any finishing cuts without the need for extra set-ups. Such practice relieves internal stresses which may result in warpage of the machined surfaces. The casting is held in a fixture that is bolted to the T-slots of a square, rotary indexing table.

A normally difficult machining operation is the turning or milling of an external cylindrical bearing surface on a part having its periphery partially obstructed. Such a part is shown in Fig. 3 being milled on a horizontal boring machine equipped with a power-driven rotary table and a right-angle milling attachment.

The surfaces to be machined are arcs, 2 inches and 1/2 inch wide, having radii of 14.750 and 15.240 inches, respectively. The arcs form part of the periphery of the steel weldment, and are interrupted by bracket extensions that project radially from the work. These obstructions pre-

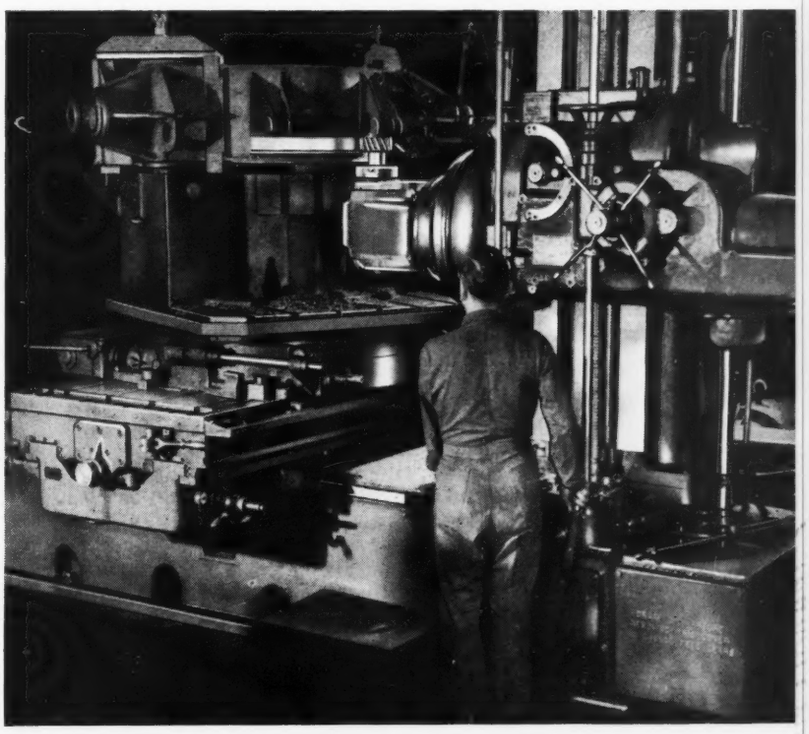
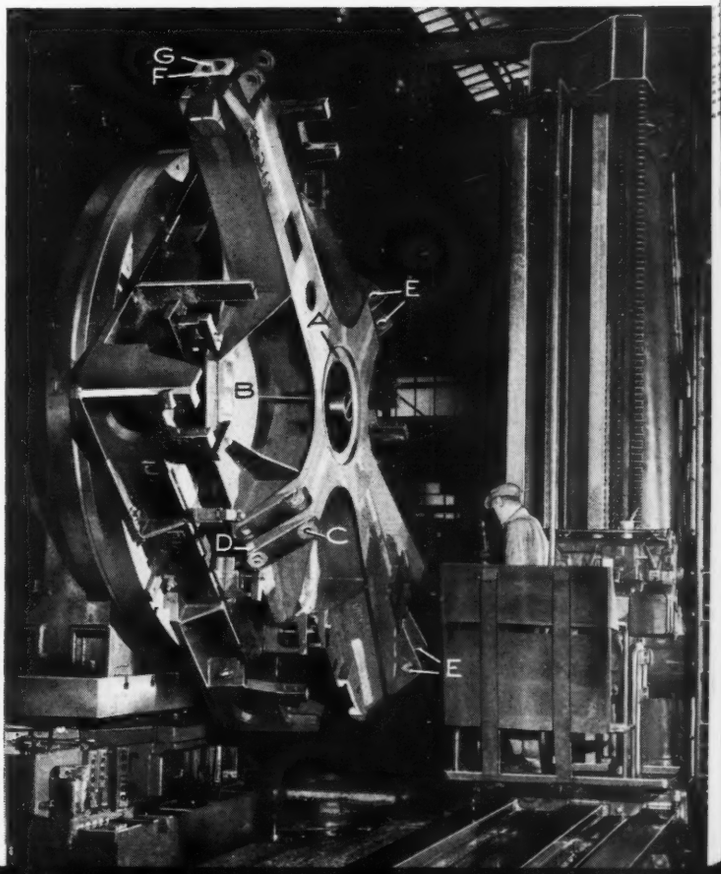


Fig. 3. Power-fed rotary table and right-angle milling attachment are employed on a horizontal machine to mill the interrupted periphery of the large steel weldment as shown

Fig. 4. Use of combination rotary table permits machining surfaces indicated by letters in one set-up



vent the use of a conventional continuous turning operation. Also, turning would require the use of relatively slow cutting speeds and reversals in the direction of work rotation between each cut.

A half side mill, 5 inches in diameter and 2 inches wide, is mounted on the vertical spindle of the right-angle attachment. Face cutting teeth are provided on the under side of the milling cutter to permit milling the shoulder formed between the two radial surfaces. The tool is accurately located with relation to this shoulder by elevating the headstock of the machine, and the diameters of the machined surfaces are controlled by longitudinal adjustment of the saddle. About 1/4 inch of stock is removed from each of the three surfaces in the roughing operation, with the cutter rotating at 40 R.P.M. For finishing, the speed of the cutter is increased to 50 R.P.M. and 0.012 inch of stock is removed.

Combination rotary tables are sometimes employed to rotate work in both the horizontal and vertical planes, so as to permit access of the machine spindle to practically every surface on the work. The use of such a table is illustrated in Fig. 4, where a large complex-shaped weldment is shown, ready for machining the surfaces indicated by letters in a single set-up.

The table is clamped to the floor plate of a floor type horizontal boring, drilling, and milling machine. A work-holding fixture is bolted to the vertical face of the rotary table. After the weldment has been set up in the fixture, centrally located counterbored surface *A* is rough-milled. The feed for this operation is derived from vertical rotation of the table rather than from movement of the headstock. Pads *B*, located between the four arms of the weldment, are then rough- and finish-faced. Surface *A* is finish-faced and counterbored by means of a continuous-feed facing head, which has the lateral (crosswise) feed necessary to machine a wide face within a bore.

Bosses *C* on the set of wings extending from each of the four arms are machined by the helical teeth of a long shell end-mill. Simultaneously, the end or face teeth of the cutter are used to face the pads *D* between each set of wings.

An angular milling attachment is mounted on the headstock of the machine to drill and ream the eight holes *E*, two on each set of wings. The compound table is then rotated in a vertical plane to bring surface *F* into a vertical position, and indexed through an angle of 90 degrees in the horizontal plane to bring the surface opposite the machine spindle for a face-milling operation.

Finally, the machining is completed by boring holes in the ends of the arms, as indicated at *G*. The hole shown at *G* is 4 1/2 inches in diameter, and this dimension is maintained within plus or minus 0.001 inch. The hole in the end of the arm diametrically opposite is bored to a 2.750-inch diameter.

* * *

Drilling Half-Holes by the Use of a Simple Jig

Half-holes in an airplane nose-gear steering collar that were formerly rasped out with a file at the plant of the Texas Engineering & Mfg. Co., Inc., Dallas, Tex., are now being produced

Simple method of producing half-holes in casting lugs

by the use of a portable electric drill and a simple jig, as illustrated. The jig consists of a steel plate, which is attached to the back of the workpiece, and a block that is mounted by means of a locating pin on the lug in which the half-hole is to be drilled. A finished half-hole can be seen in the lug at the lower left of the illustration.

* * *

One out of every seven pay checks issued in the United States during 1948 went to the nine million persons employed directly or indirectly in the manufacture, distribution, and operation of motor vehicles.

New Edition of MACHINERY'S HANDBOOK

MACHINERY'S HANDBOOK, Fourteenth Edition. 1911 pages, 4 1/2 by 7 inches. Published by THE INDUSTRIAL PRESS, 148 Lafayette St., New York 13, N. Y. Price, $7; add 60 cents for postage to Canada and overseas.

The fourteenth edition of MACHINERY'S HANDBOOK is now ready for use. The 864,000 copies of the thirteen preceding editions have gone to every part of the civilized world. There are, of course, definite reasons for this universal use. MACHINERY'S HANDBOOK contains basic information, data, and formulas for use in either designing or building any type of machine or other mechanical device. It may be defined as a reference book which, although specialized in character, is just as broad in its application as the machine building field.

It is evident that this universal usage involves great responsibility in keeping the HANDBOOK abreast of current developments. An important factor in maintaining a high standard is the selection of matter likely to be of the greatest use to the largest number of designers and manufacturers of mechanical products.

One of the outstanding features in the fourteenth edition is the Unified and American Standard Screw Thread System. This 1949 revision is designed to provide interchangeable screw threads in the United States, Canada, and the United Kingdom. The new classes of screw thread limits occupy twenty-four pages and represent a very important development in the new standard. Bold- and light-face types in the tables show clearly which figures belong to the Unified Series and which apply only to the American Standard. These tables of limits are essential to the practical application of this standard.

The revised section on broach design includes pitch formulas which give (1) the minimum pitch of broach teeth as limited by the receiving capacity of the chip space; and (2) the allowable pitch as determined by the usable power of the broaching machine. The section also contains data on broach steels, depth of cut per tooth, face and clearance angles, land width, fillet radius, and data for designing surface broaches.

Motors are now incorporated in the design of so many different types of machines that the latest standards pertaining to mounting, dimensions, and the practical application of motor drives are especially useful to designers. The HANDBOOK contains the revised mounting and other important dimensions as standardized in the United States by the National Electrical Manufacturers Association.

Another useful section in the new edition deals with the commonly used types of alternating- and direct-current motors and their operating characteristics. This data is for the general use of machine designers and for machinery builders who need practical information about motor selection and the relation between different types, as well as their adaptability to various classes of service. A two-page chart shows motor characteristics and typical applications.

The section on worm-gearing has been revised throughout, in order to present more conveniently data and formulas usually required by designers. Direct simplified solutions are given for such conditions as fixed ratio and center distance or fixed ratio, pitch, and lead angle, with information on materials for worm-gearing, operating temperatures, water and forced-air cooling, and efficiency and horsepower rating as determined both for wear and strength loads.

The extensively revised section on roller chains includes recommended maximum sprocket speeds for various tooth numbers and chain pitches; horsepower ratings tabulated for different pitches, speeds, and small sprocket sizes; standard chain dimensions; standard sprocket dimensions; standard tooth forms; and standard space cutters for sprockets.

The standard compositions of 156 carbon and alloy steels are given as revised and approved by the Iron and Steel Division of the Society of Automotive Engineers and by the American Iron and Steel Institute. There is also considerable practical information concerning typical applications of various steels.

The general section on screws, nuts, and bolts contains the revised American Standard for Machine and Cap Screws, including, in addition to the common forms, the 100-degree flat head, the pan head, the binding head, and the truss head. The standard also includes cap-screws.

The practice in sharpening carbide tools as presented in the HANDBOOK represents the recommendations of forty prominent machinery and abrasive manufacturers. Specific information is given on the types of grinding wheels, their selection and applications; also the pro's and con's of wet versus dry grinding.

Our allotment of space for this review will not permit further comment on other additions and improvements. We hope, however, that readers interested in this fourteenth edition will obtain a copy for examination and thus determine for themselves the extent to which it meets their particular requirements.

Materials of Industry

THE PROPERTIES AND NEW APPLICATIONS OF MATERIALS USED IN THE MECHANICAL INDUSTRIES

New Steel Developed for Plastic Mold Cavities

The Carpenter Steel Co., Reading, Pa., is producing a new steel for plastic mold cavities and force plugs which offers the moldmaker an unusual combination of properties. Known as "Samson Extra," it is an alloy steel which provides excellent hobbing qualities, in addition to good machinability and high core strength.

It is claimed that with this steel many intricate mold shapes can be hobbed in one operation, deeper impressions can be made with present equipment, and more accurate reproduction of hob design is possible. Field tests show that mold cavities made from the new steel have unusually high strength and resistance to sinking, because the yield strength of the steel when oil-quenched is about double that of a good grade of hobbing iron. 201

Bright-Annealed Stainless Strip Steel Available in 15-Inch Width

An 18–8 bright-annealed stainless strip steel, which is said to be wider than anything heretofore produced, has been announced by the Wallingford Steel Co., Wallingford, Conn., a subsidiary of the Allegheny Ludlum Steel Corporation. The new product, which is cold-rolled up to 15 inches in width, will make it possible to fabricate many items previously unobtainable in bright-annealed stainless steel. 202

Zinc Die-Castings Repaired with Low-Heat Alloy

Zinc die-castings can be repaired quickly and inexpensively with a low melting point alloy known as "Eutec-Die Cast-Weld" and "Eutector Flux," which are manufactured by the Eutectic Welding Alloys Corporation, 40 Worth St., New York 13, N. Y. The low-heat alloy can be used without the flux, but greater fluidity is achieved when the flux is employed.

The alloy is extremely fluid and permits welding without fusion or puddling of the base metal. It bonds at 600 degrees F. and provides an excellent color match when applied to zinc die-castings. It is designed for use with oxy-acetylene, oxy-hydrogen, and similar gas torches..203

Extruded Kennametal being Produced in a Variety of Shapes

Three standard shapes of extruded Kennametal are being produced by Kennametal Inc., Latrobe, Pa., as well as special shapes made to order. These standard extruded shapes are applicable for many purposes. Solid rounds are used as feed-fingers, rollers, laps, scribers, engraving tool points, thread checking wires, punches, and wear pins. The tubes are suitable as wire and thread guides, orifices, nozzles, punch and die parts, etc. Flats are used as centerless grinding rests, wear strips, inserts for woodworking tools, and other purposes.

Kennametal extruded shapes are available in four different compositions: KE5 (90 Rockwell A) and KE7 (91.5 Rockwell A) are straight tungsten-carbide grades suitable, because of high hardness, strength, and abrasion resistance, for a variety of wear-resistant applications; and K138 (90.5 Rockwell A) and K138A (89.5 Rockwell A) are special grades that retain their strength and resistance to corrosion and abrasion at high temperatures. The specific gravity of K138 and K138A is one-third that of conventional carbides and two-thirds that of steel. Their resistance to thermal shock is greater than that of ceramics. 204

Heavy-Duty Industrial Grease for Winter Use

A soft consistency grease for winter use in heavy-duty industrial service has been developed by the Texas Co., New York City. The new material, known as "H Grease O," has a lime-soap base, is gold in color, and is particularly suitable for low-temperature applications. The "H Grease" series is designed for service where higher viscosity mineral oils are required than are provided in ordinary cup greases. 205

Improved Carbide Grade for Machining Cast Iron of High Tensile Strength

Higher hardness, more wear resistance, greater cutting edge strength and cratering resistance, and a more rapid dissipation of heat at the cutting edge are claimed for an improved No. 905 grade of Carboloy cemented carbide, which is used for light roughing and finishing cuts on non-ferrous metals and cast irons with hardness up to 550 Brinell. According to the Carboloy Company, Inc., Detroit, Mich., tools tipped with this material have an even longer service life and maintain size better on long cuts and high-production jobs than tools tipped with the former 905 grade. Performance has also shown that heat is carried away faster from the cutting edge of the tools. The new material is said to be fully as easy to braze and grind as the previous grade.

Indicative of the results obtained is the precision boring of back bearing holes for crankshafts in alloy cast-iron cylinder blocks, in which tools tipped with the new grade of cemented carbide are finishing 2000 pieces per grind. 206

Stable Graphite Film Applied to Almost Any Surface

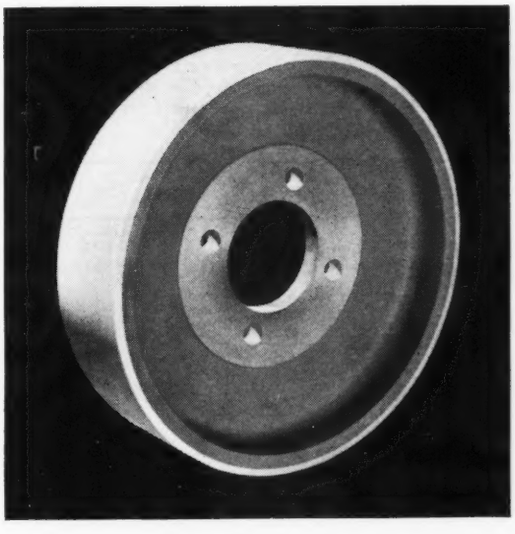
The Electrofilm Corporation, 7116 Laurel Canyon Blvd., North Hollywood, Calif., after ten years of research, has developed a highly successful means of applying a stable graphite film to practically any surface. This new film is extremely thin (0.00015 to 0.0005 inch), but has excellent resistance to abrasion and high bearing strength. Adhesion to a surface is high, and sufficient diffusion is obtained to insure the presence of a graphite surface even in cases where the external coating has been removed.

This graphite treatment is applied by a spray or dip, following normal surface preparation, and has been successfully used on metal, plastics, rubber, and ceramics. For most purposes, no plating is required, although Electrofilm graphite can be applied over plated parts.....207

Stainless Steel that Responds to Low-Temperature Hardening

A new grade of stainless steel, developed by Armco Steel Corporation, Middletown, Ohio, has high hardness and strength, excellent corrosion resistance, and good fabrication characteristics, although it requires only a low-temperature (850 to 1000 degrees F.) hardening treatment. This alloy, called Armco 17-4 PH stainless steel, is recommended especially for gears, cams, shafting, chains, valves, and pump parts in equipment where high mechanical properties and corrosion resistance better than can be obtained with present standard hardenable grades of stainless steel are necessary.

Hardness values of 40 to 45 Rockwell C, with high tensile and yield strengths, are obtainable by precipitation hardening, which requires heating the annealed material to approximately 900 degrees F. for about one hour and cooling in air. Heat-treating at only 850 to 1000 degrees F., instead of at the high temperatures normally used with standard hardenable stainless steels, eliminates problems such as quenching cracks, distortion, internal stresses, and objectionable scaling. Since only an easily removed surface discoloration is produced in the precipitation hardening of the new stainless steel, parts can be finish-machined before hardening. This eliminates expensive grinding or finish-machining operations, such as are ordinarily required after heat-treatment. 208



Silicone rubber can be bonded to the periphery of an aluminum casting, as shown in the illustration. This rubber withstands temperatures ranging from —160 to 500 degrees F., and is resistant to permanent compression and effects of prolonged exposure to the atmosphere. Bonding of this rubber to metals makes possible a wide range of industrial applications. This development has been announced by the Stalwart Rubber Co., 157 Northfield Road, Bedford, Ohio

Lead-Bearing, Free-Machining Steel Screw Stock

A lead-bearing, cold-finished bar steel, known as "La-Led" free-machining screw stock, has been placed on the market by the LaSalle Steel Co., Chicago 80, Ill. This is an open-hearth steel which has good ductility, permitting bending and crimping operations. It is also said to carburize better and have a sounder cross-section than Bessemer steel free-machining stock.

Studies have shown that the lower friction between the tool face and the chip being removed from lead-bearing steels helps to keep the cutting edge of the tool from overheating and failing. The phosphorous and sulphur contents of "La-Led" also aid its machinability.....209

Use of Plastic Coating Simplifies Finishing Process

The use of a transparent plastic coating, called "Krylon," manufactured by the Foster & Kester Co., Philadelphia, Pa., has made it possible to reduce the number of processes usually required to prevent rust and corrosion on metal stampings such as camera and radio parts. When this coating is used after Black-Ox processing, it is said that several plating steps and a final oil dip treatment may be eliminated.

This plastic coating, which has the appearance of a baked on finish, shows no tendency to pull off after dipping. Stampings can be handled in two minutes and the coating hardens in five minutes. Parts that are in contact can be pulled apart without causing holes in the finish, as the plastic adheres evenly and firmly to any surface to which it is applied. Large surfaces can be coated quickly and economically by spraying, and if necessary, the desired thickness of the coating can be varied by use of a solvent supplied by the manufacturer. 210

All-Welded Wire Cloth with High Strength

A line of square mesh, all-welded industrial wire cloths has been brought out by Wickwire Brothers, Inc., Cortland, N. Y. The new wire fabrics, which have high strength, are the result of an electric welding process that joins lateral and transverse wires together at the points where the wires cross.

The special welded construction eliminates the crimping or interlocking inherent in ordinary woven wire cloths. At the same time, it makes possible the use of finer gage wires for the same mesh sizes, since all cross wires lie on the same side. These wire cloths are available in a heavily galvanized or a plain steel finish. 211

Synthetic Agent for Degreasing Metal Parts

The Bee Chemical Co., 13799 S. Avenue O, Chicago 33, Ill., has announced a synthetic emulsion degreasing agent that overcomes disadvantages of natural materials used for the purpose. This product, called "Mulsolv," is intended for use in standard cleaning equipment for removing grease from metal parts prior to assembly or preliminary to preparation for shipping. It is non-toxic and requires no protective provisions to guard against dangerous fumes. Also it does not irritate the skin or nasal passages.....212

To Obtain Additional Information on Materials of Industry

To obtain additional information about any of the materials described on these pages, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning name of material as described in December, 1949, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

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Semi-Automatic Machine for Spraying Coating on Camera Parts

By GLENNDON HILGE
Engineering Department
Argus, Inc., Ann Arbor, Mich.

THE precision threaded metal rings shown at the left in Fig. 1 comprise a group of holders or adapters in which various auxiliary lenses and filters are mounted for use on cameras. At the extreme right is shown a hood designed to prevent the rays of the sun from falling directly on the camera lens or on any of the auxiliary lenses or filters with which it may be used.

If good pictures are to be obtained through the use of these rings, adapters, or shades, their interior surfaces which are exposed to the camera lens must be of a light-absorbing nature, so that they will not reflect light on the lens. Since no ordinarily used machineable materials have the required light-absorbing characteristics, a material is selected that has other desirable properties, such as easy machineability and pleasing appearance. A light-absorbing coating or finish is then applied to all surfaces of these parts that might possibly reflect light on the camera lens. In this case, the material selected was an aluminum alloy, which can be given an attractive and durable outside finish.

One of the best light-absorbing coatings or surfacing materials for aluminum alloy is a dull black paint or lacquer. The use of this paint on the inner surfaces of the rings necessitates masking the threads so that the coated parts can be properly assembled. The light-absorbing coating material is not especially durable, however, and for this reason, is not suitable for the outer surfaces of the parts, which must have an attractive finish that will withstand considerable handling.

The problem consists of providing means for adequately masking the inner surfaces on which no coating is desired while the required coatings are being applied. As these products are in a highly competitive field and are needed in large quantities, all ordinary masking methods such as using tape are inadequate. With these considerations in mind, automatic equipment such as shown in Fig. 3 was designed and built for the coating operations. The success of this equipment is best illustrated by the fact that it is being used to coat lens adapter rings at the rate of over 250 pieces per hour.

For the coating operation, the lower mask shown in Fig. 4 and at the bottom in Fig. 2 is mounted on the lower mask-holder *C*, Fig. 3, of the semi-automatic machine. The lens-holder to be coated, similar to the one shown just above the lower mask in Fig. 2, is simply slipped over the lower mask-holder, as indicated in Fig. 4. The upper mask, seen above the lens-holder in Fig. 2, is mounted in the upper mask-holder *L*, Fig. 3, so that it is automatically brought down over the lens-holder, as shown in the lower view of Fig. 4, just before the light-absorbing coating is sprayed on the surfaces indicated.

Both the upper and lower masks are made in duplicate, so that one set can be allowed to soak

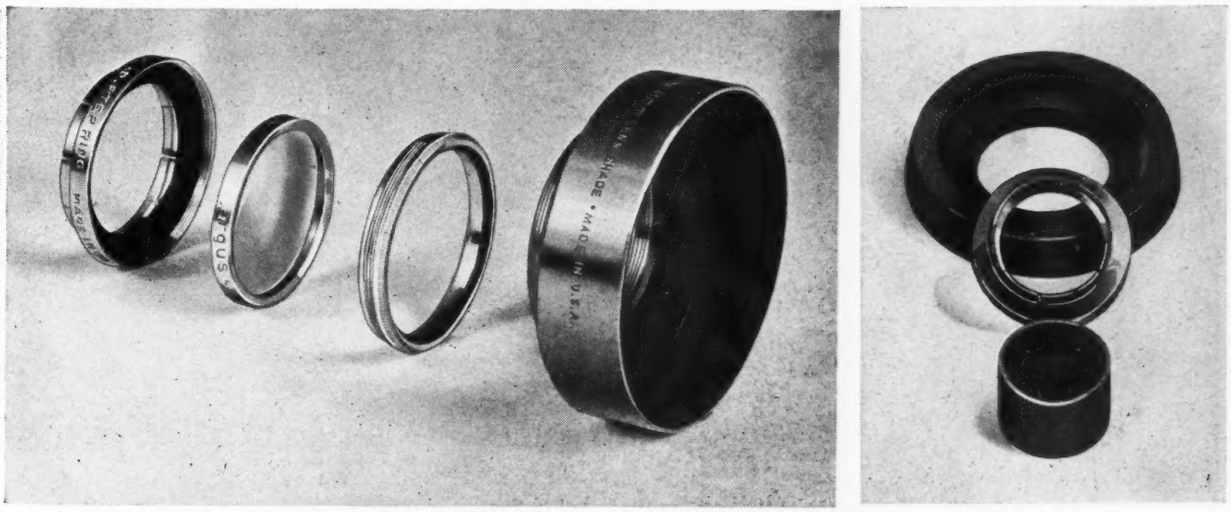


Fig. 1. (Left) Auxiliary lens- or filter-holders and hood for cameras, which are coated with light-absorbing paint on machine shown in Fig. 3. Fig. 2. (Right) Upper and lower steel masks used in coating lens-holder shown between the two masks

in a cleaning solution while the other set is being used. Changing of the masks is necessary because the coating material builds up on them during use. The masks have to be changed after every two or three hundred lenses are sprayed.

Briefly, the coating operation consists of placing the lens-holder to be coated on the lower mask and depressing the foot-pedal, which operates the machine through an upward movement of the connecting link *O*, Fig. 3. The downward movement of the foot-pedal causes the lower mask and the lens-holder to start revolving and the

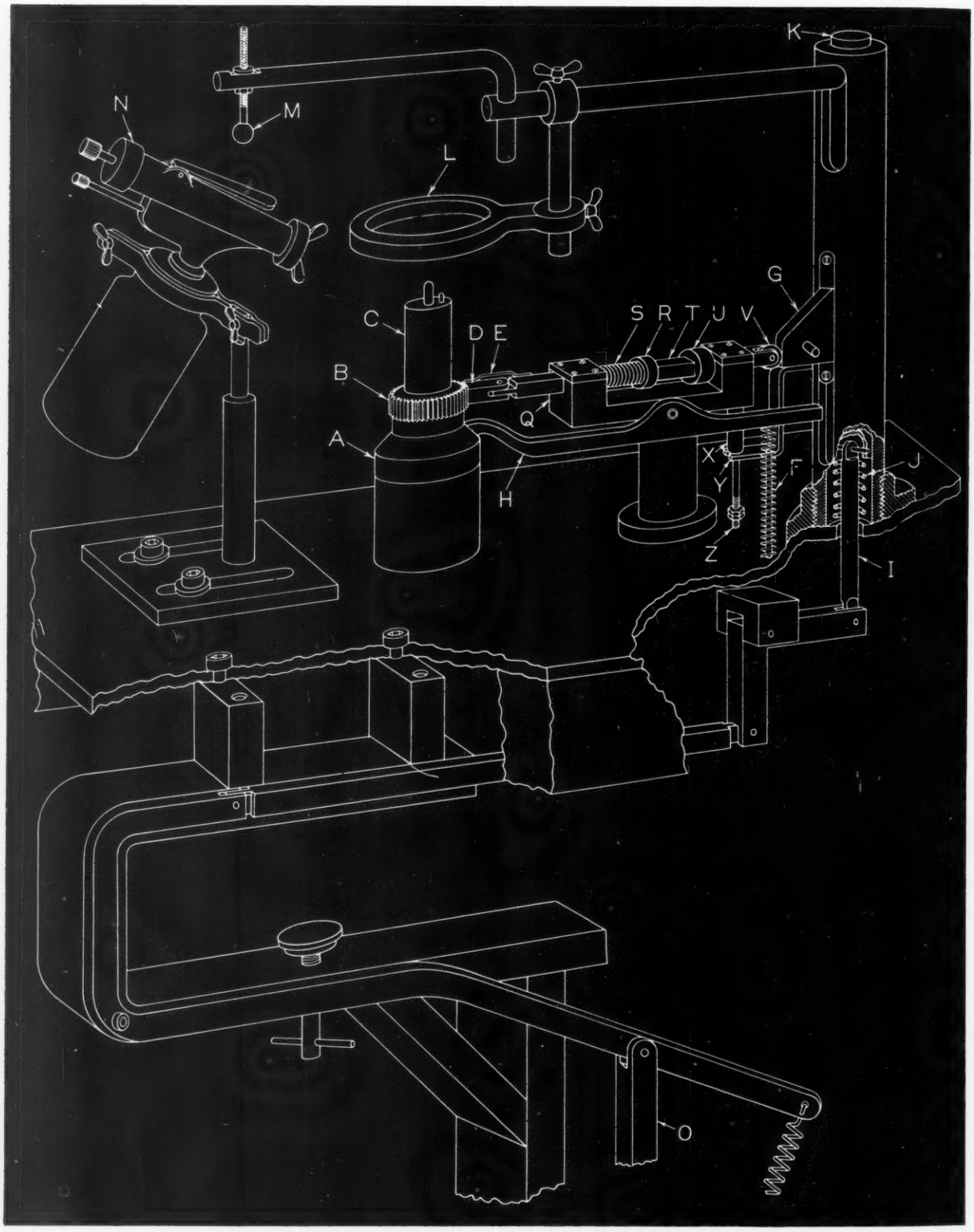


Fig. 3. Diagrammatic illustration of semi-automatic machine developed for spraying coating on selected inner surfaces of camera lens adapters and hoods, such as shown in Fig. 1

upper mask to be brought into position over the lens-holder, as indicated in the lower view in Fig. 4. Further downward movement of the foot-pedal starts the spray gun, which applies a coating of the light-absorbing paint to the revolving lens-holder on the exposed surfaces between the upper and lower masks, which also revolve with the work.

As soon as pressure is removed, the foot-pedal is raised by the action of a spring. A brake automatically stops rotation of the work and the masks. The upper mask and its holder are then raised to permit the coated lens-holder to be removed. Another lens-holder can now be placed on the lower mask and the operation repeated. After being painted or coated, the parts are removed from the machine and placed on trays. The trays of parts are run through an infra-red baking unit to complete the coating operation.

The general design of the semi-automatic spraying machine is shown diagrammatically in Figs. 3, 4, and 5. The machine is attached to a bench by means of the clamp screw and bracket assembly shown in the lower part of Fig. 3. The compression spring *J* and the expansion spring connected to the outer end of the lever to which link *O* is attached combine to exert upward pressure on the round sliding shaft *K*, so that its normal position is at the top of the stroke. Depressing the foot-pedal transmits upward motion to the vertical connecting link *O*. This motion of the foot-pedal, acting through the U-shaped lever, bellcrank, and link *I*, results in a downward movement of the shaft *K*.

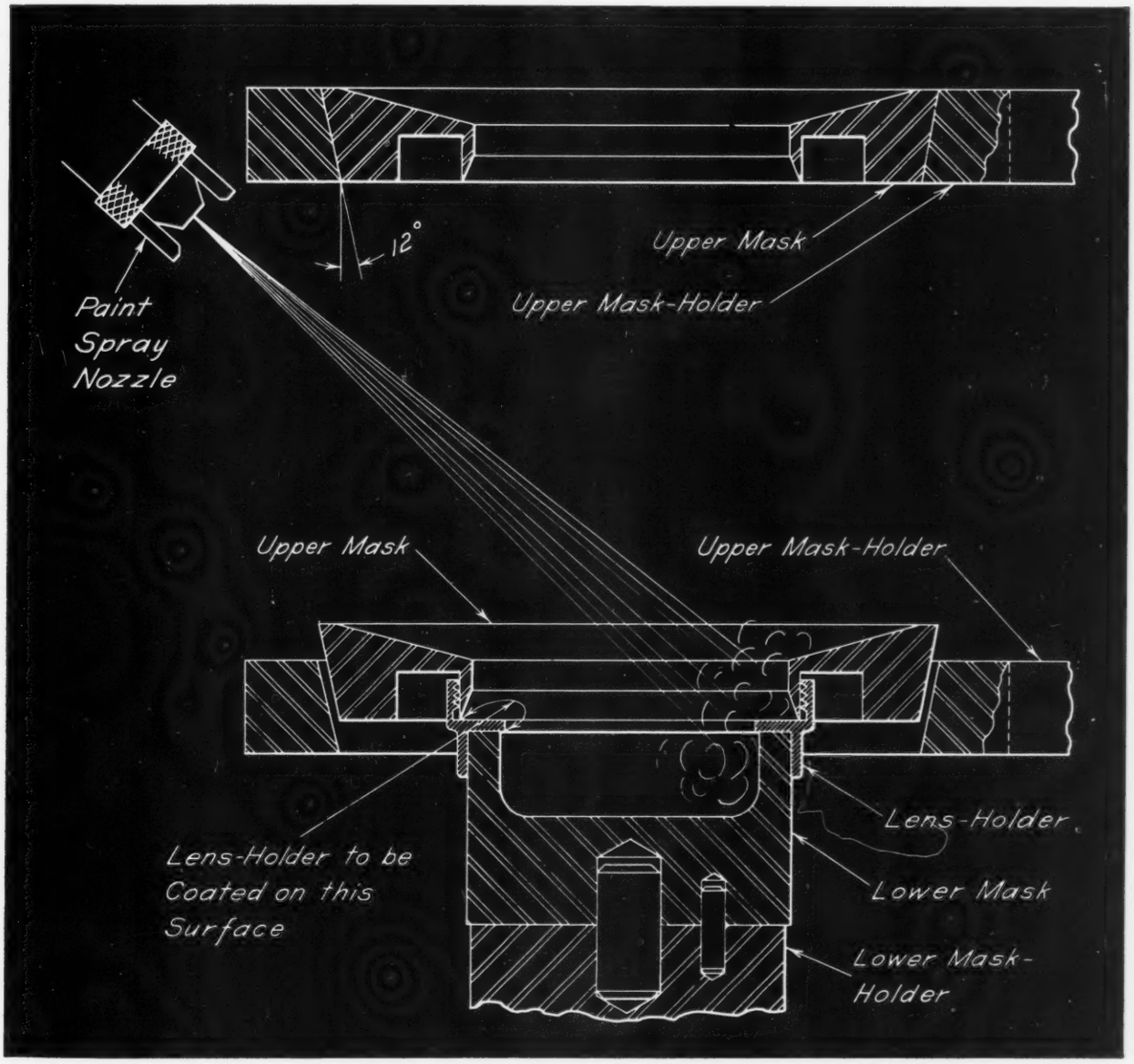


Fig. 4. (Upper View) Upper mask, shown at top of Fig. 2, assembled in holder of semi-automatic spraying machine. (Lower View) Lens-holder mounted on lower mask, with upper mask in place for application of coating to the inner surface by a spray gun while work revolves

As shaft *K* moves down in its cylindrical housing, the cam *G*, attached to the shaft, also moves down, causing a pin on the side of cam *G* to contact the end of brake lever *H* and press it down against the pressure of spring *F*. This releases the braking action previously applied by spring *F* to the ball-bearing housing *A* of mask-holder *C* through a brake pad attached to the opposite end of lever *H*. The mask-holder *C*, with the lower mask, the lens-holder to be coated, housing *A*, and ratchet wheel *B*, is then free to rotate.

Continued downward movement of shaft *K* through pressure on the foot-pedal brings the trip *Y* attached to cam *G* into contact with the top lock-nut on the pin *Z*, forcing it downward, so that square shaft *T* is unlocked and forced to the right by the previously compressed spring *S*. The pawl *D*, attached to shaft *T* and held in mesh with the ratchet wheel *B* by spring *E*, causes housing *A* and the work to rotate rapidly as a result of this spring-actuated movement of the shaft *T*.

In the meantime, the horizontal shaft attached to shaft *K*, which supports the upper mask-holder *L*, has also moved downward, lowering the upper mask into place on the ring to be coated. The ball trip *M*, carried by the same horizontal shaft, then contacts the trigger of the paint sprayer, releasing the paint spray, as indicated diagrammatically in the lower view of Fig. 4. Thus the coating is sprayed on the rotating ring, so that it covers the surface exposed between the upper and lower masks.

As soon as the ring is coated, the operating pedal is released, which causes shaft *K* to move upward under the combined pressure of spring *J* and the spring attached to the outer end of the U-shaped lever to which the foot-pedal link *O* is attached. The upward movement of shaft *K* raises the ball trip *M* out of contact with the trigger of the paint sprayer, cutting off the spray. Continued upward movement causes the holder *L* to pick up the upper mask and raise it out of contact with the work. As cam *G* moves upward, the pin projecting from its side releases lever *H*, permitting it to bring the revolving housing *A* and the work to a stop through the braking force applied by spring *F*.

Further upward movement brings cam *G* into contact with roller *V*, attached to the end of shaft *T*. As the upward movement continues, spring *S* is compressed between the thrust collar *R* and the housing *Q* until plunger *Z* is forced up into a recess in shaft *T*, as shown in Fig. 5, by the spring *W* in housing *X*. This places shaft *T* under spring pressure, ready to be released on the next downward movement of the operating pedal.

The rubber washer *U* serves to prevent excessive wear on the lock-collar *R* and the support for shaft *T*. The upper mask-holder *L*, Fig. 3, is bored internally to a 24-degree included angle, as indicated in the upper view in Fig. 4, and the upper masks are turned on the outside diameter to fit this angle. The lower masks are drilled to center on the large pin of the lower mask-holder and to fit the small pin adjacent to it, which serves as a driver.

The upper mask-holder *L*, Fig. 3, is adjusted by the thumb-screws and vertical rod so that the upper mask will be brought to rest on the ring to be painted an instant before the lever that actuates the spray gun is tripped by stud *M*. A hood connected to an exhaust system is placed in back of the machine to carry away any excess coating from the spray gun.

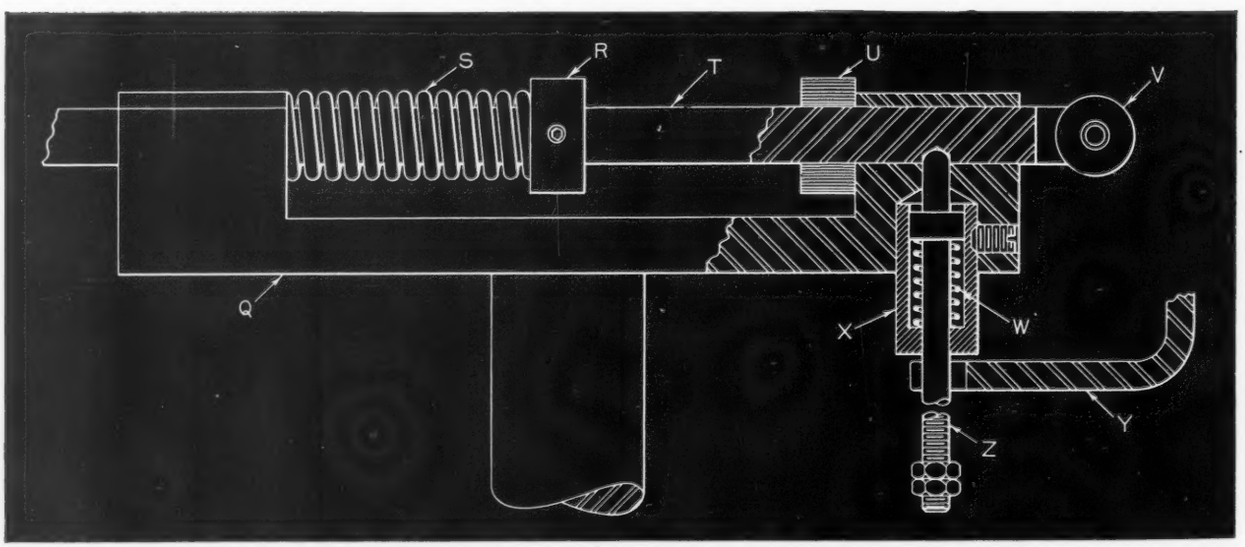


Fig. 5. Construction details of shaft T and trigger-releasing mechanism employed to impart spinning motion to holder C, Fig. 3, through ratchet wheel B and pawl D

Tool Engineering Ideas

Tools and Fixtures of Unusual Design, and Time- and Labor-Saving Methods that Have been Found Useful by Men Engaged in Tool Design and Shop Work

Milling Fixture for Right- and Left-Hand Forgings

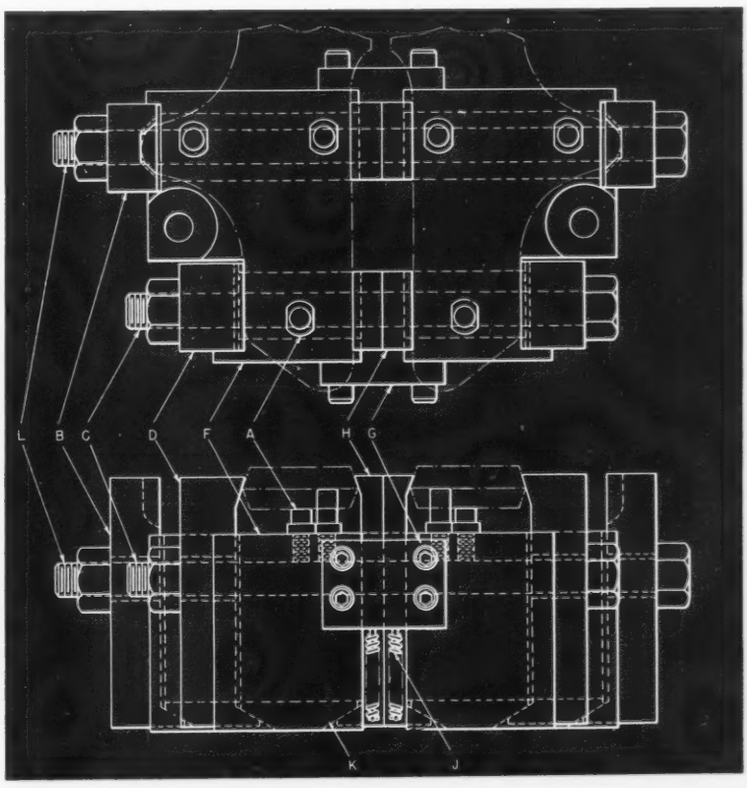
By R. MERY
Liberty Aircraft Products Corporation
Farmingdale, Long Island, N. Y.

The fixture shown in the accompanying illustration was designed to locate and tightly clamp right- and left-hand chromium-molybdenum steel forgings for a milling operation. As indicated by dot-and-dash lines in the illustration, one right- and one left-hand forging are held in the fixture at a time. A 3/32-inch cut is milled on both sides of these parts. This is accomplished by changing their relative positions in the fixture after machining one side of a lot.

Each forging rests on three buttons *A*, which can be adjusted to suit two levels resulting from a step in the forged contour of the parts. Four clamps *H*, which move vertically in their seats in the fixture base, have angular faces and are held in an open position by means of springs *J*. The springs are secured at one end to plates *G* that close off the grooves in which clamps *H* are seated, and are attached at the opposite end to the lower part of the clamps.

At the outer portion of the fixture, two clamps *D*, also having angular faces, engage the narrow end of the work opposite one pair of clamps *H*. All of these clamps have a 30-degree angle at the bottom, mating with angles on a wedge-bar *K* which is free to move laterally. By tightening the nut on a bolt *C* that passes through clamps *D* and *H*, the outer clamps are moved in and down toward the work and clamps *H* are pulled down to tighten the forgings against buttons *A*.

Two clamps *B* are actuated in a similar manner to secure another portion of the forgings in the fixture. A bolt *L* passes through these clamps and another pair of clamps *H*. Tightening the nut on this bolt produces the same action on clamps *B* as is produced on clamps *D*, and vertical movement is transmitted to clamps *H* through another wedge-bar *K*. The work-holding end of clamps *B* has a V-shaped face to facilitate loca-



Eight clamps are actuated by tightening two nuts in this milling fixture for machining both sides of right- and left-hand forgings

tion of the irregular contour of the forgings. A spring and plunger (not shown) maintain the open position of these clamps and also clamps *D* when loading and unloading the fixture. Quick clamping action is provided by this design, since four clamps tighten the work in the fixture simultaneously.

A Milling Machine Turntable that Reduces Friction in Indexing

By ROBERT MAWSON, Providence, R. I.

One of the most useful attachments designed to reduce lost time during milling operations is the turntable. The milling machine turntable here described is unusual in that it can be rotated easily and quickly with a minimum amount of friction. Fastening of heavy work-pieces on the table does not reduce the ease with which the table is manipulated. Positive and rigid location of the table in its machining position is accomplished automatically.

As shown in the illustration on the opposite page, the turntable consists of a cast-iron base *A*, to which are secured two steel keys *B* for locating the attachment with relation to slots in the milling machine table. Four holes are provided in the base for bolting the turntable to the machine. The part to be machined is fastened to the circular steel table *C*, which fits on the machined surfaces of the base.

The turntable is indexed by moving handle *R* through one-half of a revolution. This rotates cams *W*, which act on the forked end of lever *H* to pivot it about yoke *F*, thus lifting shaft *M*. Upward movement of shafts *M* lifts ball *N*, thus raising table *C* clear of base *A*. The table then rests solely on the ball, and can be rotated by hand with a minimum amount of friction.

When a machined part has been removed and another work-piece fastened in place, the table is rotated to one of the three machining positions. The table is automatically located in these positions when spring-actuated pin *U* enters one of the holes countersunk in the under side of the table. Handle *R* is then returned to its original position, rotating the cams and lowering the table onto the base. The finger *S*, which projects from between the cams, enters one of the slots in the ring *J* and locks the table in the machining position.

Felt washer *D*, in a groove machined in the bore of the table, keeps dirt from the mating surfaces of the base and table. Lubrication is accomplished by means of oil-cups *E*. Steel yoke *F*, which is threaded into the base of the turntable, is held in place by a brass pin *G*, backed up with a headless set-screw. The left-hand end of steel lever *H* is machined to a good fit between the projecting flanges of the yoke.

Steel ring *J* is secured to the under side of the table. A surface-hardened steel bushing *K* is pressed into the bore of base *A*. Also secured to the bottom of the table is a hardened steel ring *L* which slides within bushing *K*. A flange on the upper end of shaft *M* holds it in the bore of ring *L*. The lower end of this shaft is machined to fit into a forked section of lever *H*, the shaft and lever being held together by a connecting pin secured with cotter-pins. The top of the shaft is countersunk to provide a bearing surface for the hardened tool steel ball *N*, which is 5/8 inch in diameter.

The ball also contacts the bearing surface on hardened upper shaft *P*, which supports the table when it is lifted from the base. A clearance of 0.010 inch is allowed between the ball and the bearing surface on this shaft when the table is resting on its base in the machining position. A steel cover *O*, bored to fit shaft *P*, is bolted to the top of the table. The top of the table may be provided with slots or tapped holes to facilitate mounting the work.

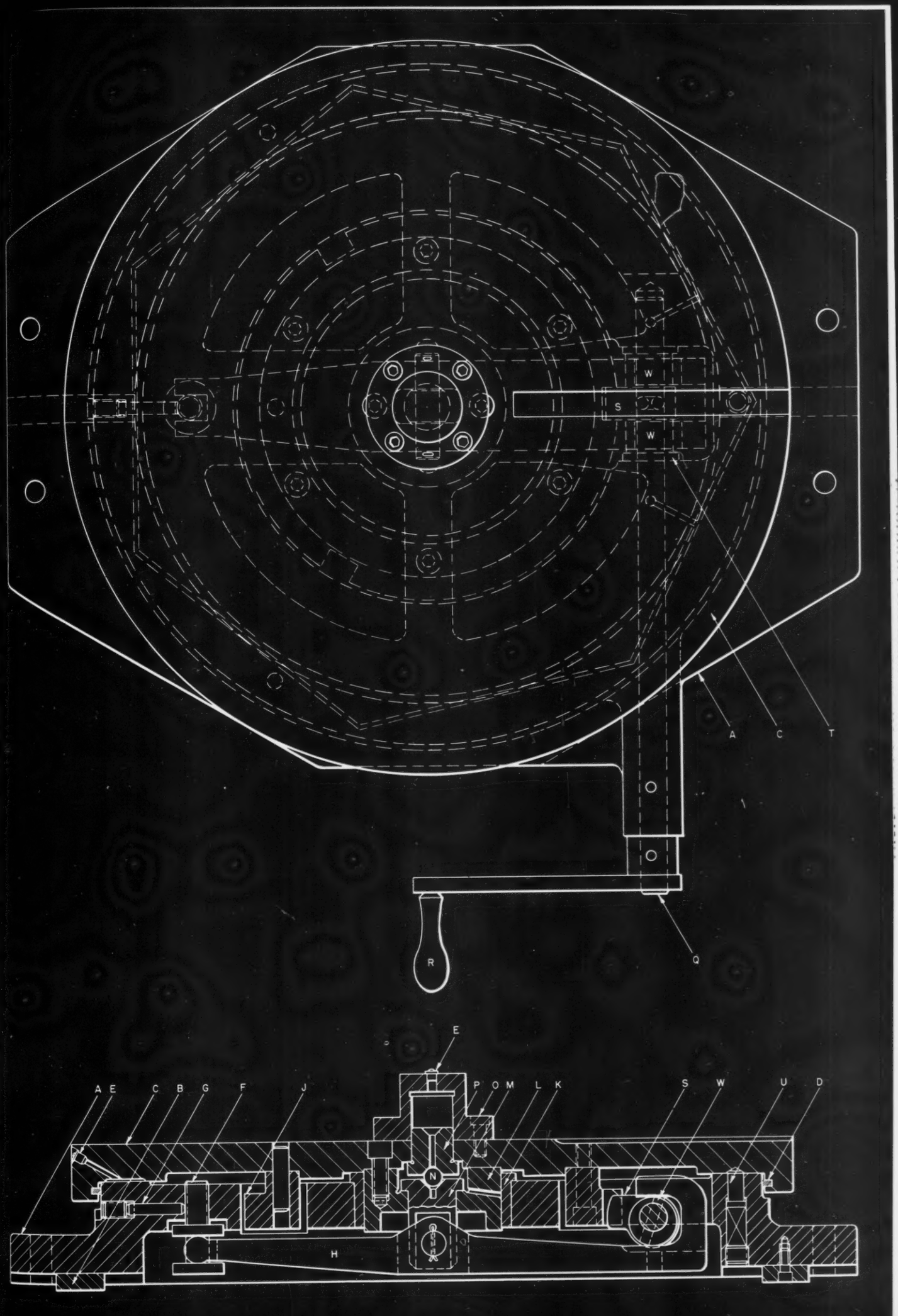
Handle *R*, the two cams *W*, and locking finger *S* between the cams are pinned to shaft *Q*, which is mounted in a hole bored in the cast projection on the turntable base. In addition to locking the turntable in the machining position, finger *S* serves to keep the cams in alignment with lever *H*. Hardened thrust washers *T* are mounted on shaft *Q*, at each end of the cam unit, and bear against the base of the turntable.

Simple Measuring Tool for Quickly Determining Developed Lengths

By ROGER ISETTS, Kenosha, Wis.

When it becomes necessary to determine the developed length of bent tubing or flat stock of intricate shape, the tool illustrated on page 194 can be used without resorting to complicated mathematics. It is easy to make and simple to operate. A round piece of cold-rolled steel can be turned to any diameter to obtain a specific circumference. For example, a diameter of 0.955 inch will provide a circumference of 3 inches. Any other desired circumference may be used, and to determine the required diameter, it is only necessary to multiply the circumference by 0.31831.

After scribing sixteen equally spaced notches around the periphery and upper face of the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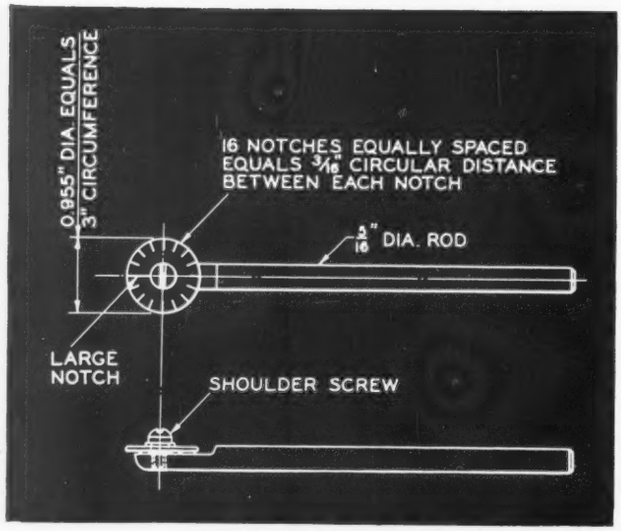


Simple measuring device that eliminates the mathematics usually required to determine developed lengths

round part by using a standard milling machine dividing head, this part is fastened to a 5/16-inch diameter rod by means of a shoulder screw, to serve as a wheel. The distance between each notch is 3/16 inch on the circumference of the wheel. One notch should be made longer than the rest for use as a starting point.

To determine the developed length of a piece of tubing, for instance, place the large notch of the wheel directly on a lay-out of the part and run it over the center line. Every revolution the wheel makes will be equal to 3 inches, to which is added the fraction of a turn resulting from any incomplete revolution. For example, if the wheel travels 6 1/4 turns, the developed length will be 18 3/4 inches. Of course, the lay-out of the part to be measured must be accurately drawn to scale in order to obtain a true reading.

The tool can easily be varied to any scale desired by using the same principle, which makes it ideal in plant lay-out work for predetermining the lengths of monorails, conveyors, piping, etc., and for figuring the distances trucks travel between machines.

Faceplate Fixture for Boring an Unsymmetrical Casting

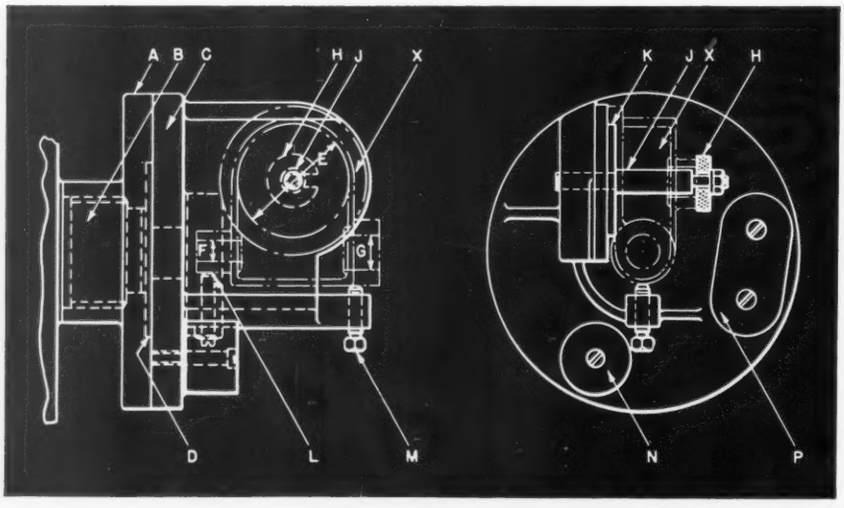
By F. H. SCRIBER

The work *X*, held in the fixture shown in the illustration below, is a gear-case casting in which the holes indicated at *F* and *G* are to be bored and reamed for a pinion shaft. The fixture is provided with a flange *C*, which is mounted on a faceplate *A*. The faceplate is attached to the spindle *B* of a chucking machine, and the fixture is concentrically located on it by means of the lip and recess construction shown at *D*.

With the retaining collar *H* removed, the work is placed over the stud *J* and is centered on the machined seat *K*. The work is securely clamped against this seat when the collar is replaced. Alignment of the holes *F* and *G* for boring and reaming is maintained by means of screws *L* and *M*, which abut the bosses through which these holes pass. Counterweights are used at *N* and *P* to balance the entire assembly on the spindle of the chucking machine.

* * *

Tin plate and terne plate accounted for 6 per cent of all the finished steel that was shipped in 1948. In 1946, the steel industry used 37,656 tons of tin to turn out 2,709,651 tons of tin and terne plate. In 1948, 38,363 tons of tin were employed in producing 4,008,488 tons of plate. The proportionate increase in the production of plate is due to the fact that tin can now be applied to steel electrolytically.



Faceplate fixture designed to hold an unsymmetrical casting securely for boring and reaming operations

Machine Tool Builders Discuss Markets and Productivity

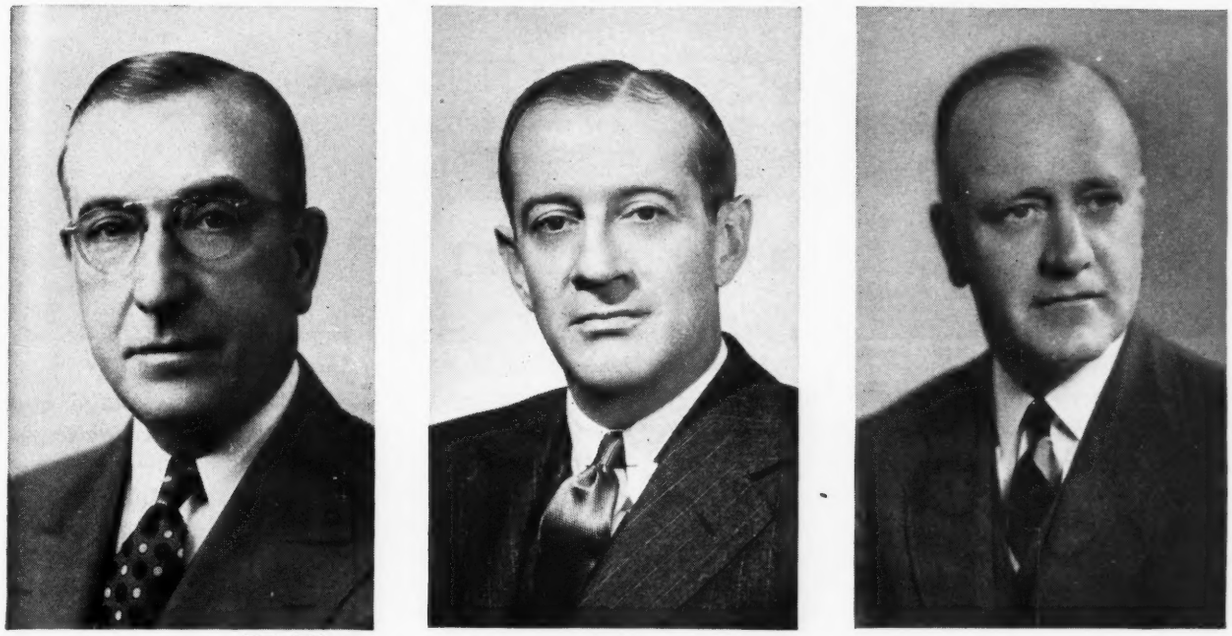


Photo Whitney

(Left to Right) David Ayr, new president of the National Machine Tool Builders' Association; Richard E. LeBlond, first vice-president; and Frederick S. Blackall, Jr., second vice-president

OPTIMISM for an early upturn of business for the entire machine tool industry highlighted the forty-eighth annual meeting of the National Machine Tool Builders' Association, which was held at the Greenbrier Hotel, White Sulphur Springs, W. Va., November 16 to 18. In his opening address, the president Lloyd D. McDonald, declared that, while machine tool sales are far below what they should be today, they are still above the pre-war average, and "sheer economic necessity will soon dictate an upturn."

Pointing out that national freedom depends upon productivity, Mr. McDonald went on to say that union restrictions upon production are levying a bill of millions of dollars upon the American public because machine tool operators, under the leadership of union stewards, hold down the output of new machines to a mere fraction of the productivity that has been built into them. The result of such limitations in output is that the general public is not getting the benefit of the advances in machine tool design, so that people are paying more for many of the things they buy than they should be in view of the methods available for producing them faster and cheaper.

"Although all industry knows that the basic answer to our social and economic progress is greater productivity," he said, "the metal-working plants are still chiefly equipped with machine tools of designs that were frozen in 1940." Three barriers were cited to the purchase of modern and more productive machines: (1) Section 102 of the Internal Revenue Code, which makes a company hesitate to build up reserves for equipment replacement through fear that it may suffer a tax penalty upon the charge of improper accumulation of surplus; (2) the system of double taxation of earnings, whereby the total profits of the corporation are taxed first, and then stockholders are taxed on such dividends as are paid out of the remainder; and (3) the policy of the internal Revenue Department with respect to depreciation schedules. Half of the funds needed for replacement can come only out of earnings after taxes. It is this factor that Mr. McDonald believes to be the primary brake upon replacement of machine tools today.

In his paper "Developing the Replacement Market," L. W. Scott Alter, president of the American Tool Works Co., pointed out that managers of metal-working industries are all confronted with these incontrovertible facts: Some-

Moffet Studio

(Left) Jerome A. Raterman, newly elected treasurer of the National Machine Tool Builders' Association

(Right) R. W. Glasner, who was recently elected a director of the Association

thing must be done now to offset the existing high labor rates, which are still climbing; stiff competition is raising its head; rapid inventory turnover is far more important now than ever before because of the high unit investment entailed; and the life of business enterprises depends upon decisions of managers to keep up at least some semblance of earnings. He urged that the Association members should promote a replacement program that "makes financial sense," and advocated that replacements should not necessarily be made machine for machine, but rather on an over-all basis.

In a paper discussing a recent survey made by the *American Machinist*, Burnham Finney, Editor, pointed out that 95 per cent of the machine tools in use today are more than ten years old in design, that over 20 per cent were actually built more than twenty years ago, and that if the rate of replacement is not accelerated, three out of four machines in American factories will be at least ten years old in 1955.

Charging that American industry is not as strong relatively as it was before the war, A. G. Bryant, vice-president of the Cleereman Machine Tool Co., and president of the Bryant Machinery & Engineering Co., advocated an American recovery program. Mr. Bryant said that Government policies, including especially the Internal Revenue Bureau's archaic regulations on depreciation of capital equipment, have slowed down the progress of modernizing American industry by placing a penalty on the introduction of more efficient machinery.

He proposed an American recovery program based upon the following three points: (1) Guide every step of our foreign policy along roads that will require our aid to be used in establishing abroad only those industries that will utilize available local resources to best advantage, and will not merely duplicate facilities already existing in this country that are ample to supply world requirements; (2) stimulate the rehabilitation of the American industrial plant, which, although the best in the world, has been allowed to deteriorate by failing to replace its outmoded pre-war machinery with post-war designs; and (3) substitute in Government a constructive attitude of reassurance to industry that efficiency and well earned profits are to be encouraged, in place of current policies that penalize progressive management and cast uncertainties in the path of venture capital.

An unusually fine address was given by Dr. Cornelius W. de Kiewiet, acting president of Cornell University, whose subject was "The Ideal of Abundance." Dr. de Kiewiet stated that the failure of British industry to modernize plant equipment fast enough to keep pace with the public demand for social progress paved the way for the triumph of state socialism in England.

He pointed out that British industrialists took their profits out in social distinction instead of plowing them back into their businesses for the purchase of modern productive equipment that would lower costs, expand markets, and raise industrial efficiency and the standard of living. He emphasized that mechanization is an indispensable factor in solving many of the world's ills, which means that a prosperous and aggressive American industrial order is as necessary as a sound American foreign policy. He said that American security and leadership are bound up with a form of government that guaranteed incentives for modernization and profits for enterprise, since profits through investment are the life blood of industry.

(Concluded on page 198)

THE SALES ENGINEER AND HIS PROBLEMS

By BERNARD LESTER
Lester, Hankins & Silver
Sales Management Engineers
New York and Philadelphia

Selling the Home Headquarters

"IT'S harder to sell my headquarters than it is the prospect," explained one machine tool salesman. Sitting in his office, I had listened to him first phone his prospect, then someone at his factory. What a contrast there was! He appeared to use up all his good will on the prospect—there was none left for his headquarters partner.

This is not a common occurrence, but it illustrates a weakness in some sales engineers. Why does this condition exist, and what is the remedy?

Selling is a nerve wracking job. There are so many obstacles to be overcome between the initial call and the written order. Interest and concentration must necessarily be maintained. In the flood of enthusiasm, if anyone at headquarters cannot readily grasp the importance and reality of a pending order, he is persona non grata to the salesman.

Of course, there are reasons why such an uncooperative situation occasionally exists. Headquarters people—engineers, estimators, correspondents—are not ordinarily too familiar with the principles of selling. They live largely with the product rather than with the market. They do not have a vivid picture of each particular prospect and his problems. When the salesman asks for this or that special feature on the machine tool or for an extra short delivery, they think mostly of the "headaches" involved if his request is complied with.

On the other hand, the salesman, unless he has spent several years at the factory, does not know what it means in extraordinary effort to meet every request. He does not realize that the headquarters man may have on his desk several requests requiring immediate attention.

With this lack of understanding, it is no wonder that the sales engineer who excells in winning the friendship and confidence of the prospect sometimes fails to apply the same principles to people at his headquarters. How, then, can the sales engineer gain the full support of his headquarters? He must apply to the centrally located members of his selling team the very same principles he applies in selling the prospect. Here are some suggestions:

1. Treat the headquarters man as your partner and equal—not as a tooth on a pinion. Don't for a minute get the impression that all the steps in selling are taken by you or your office.

2. Give him all the facts pertinent to the request in hand—with some picture of the important results that may come from his help. Don't misrepresent. Where alternate answers are feasible, state them clearly, thinking and acting in terms of the "easiest way out" for the headquarters.

3. Don't go over the head of your headquarters man without his knowing it—and then only for the purpose of seeing that he gets the support of the man higher up. A word of praise for him helps when deserved. Blame, when it must be applied, can well be attributed to lack of understanding.

4. Progressive suppliers follow a policy of urging headquarters men to get away now and then from their desks to visit prospects and customers. Making these men welcome and giving them a taste of customer contact and sales problems goes a long way toward gaining their interest and support, and results in more intelligent cooperation. Build up the importance of the headquarters man in the eyes of the prospect. Promote the idea of such visits.

5. Give credit to the members of your headquarters team. Remember that your accomplishments are built upon theirs. When you visit headquarters, don't see only the top men. Bring to mind some good job that others on the team did that contributed to getting an order.

6. Special requests from the prospect may

occur with sufficient frequency to make it wise to suggest that more data should be made available to the field salesmen. Think in terms both of your service and the avoidance of repeated special estimates.

Today the urgent demand is for improved selling methods. There are three general ways in which this can be done. First by greater energy, skill, and persistence in selling the prospect. Second, by better organized and implemented effort at headquarters to assist the salesmen with supporting literature and data. Third, by a more intimate and effective partnership between field salesmen and headquarters personnel.

* * *

Stability of AISI Steels at Elevated Temperatures

Changes in microstructure observed in typical AISI alloy steels exposed in the welded and unwelded conditions at 900 and 1050 degrees F. for a period of 10,000 hours were described in a paper by A. B. Wilder, chief metallurgist, National Tube Co., Pittsburgh, Pa., and J. O. Light, chief metallurgist, Lorain Works, National Tube Co., Lorain, Ohio.

The steels tested were either normalized or annealed at 1650 degrees F. before exposure. The following conclusions were drawn from these tests:

1. The steels were appreciably oxidized and decarburized after 10,000 hours exposure at 1200 degrees F. in air.

2. The nickel and nickel-molybdenum steels graphitized at 1050 degrees F. after 10,000 hours exposure. Graphite was also observed in the AISI 2320 and 4640 steels after exposure at 900 degrees F.

3. The steels containing chromium did not graphitize after 10,000 hours exposure at either 900 degrees F. or 1050 degrees F. even though an appreciable amount of aluminum was used in the deoxidation practice, and in certain instances relatively large amounts of carbon were present.

4. The steels containing chromium were microstructurally more stable than those without chromium. The chromium-vanadium and chromium-molybdenum steels were the most stable.

5. The steels investigated were not embrittled by exposure at the elevated temperatures.

6. The hardness of the steels was, in general, slightly decreased after exposure.

The overall program for the study of stability of AISI alloy steels at elevated temperatures involves several alloy compositions selected for exposure at 900, 1050, and 1200 degrees F. for a period of ten years.

Machine Tool Builders Discuss Markets and Productivity

(Continued from page 196)

"Social progress," Dr. de Kiewiet went on to say, "is, after all, a reflection of work performed. Machines multiply man's capacity to turn out work, but man's willingness to work is also involved. Willingness depends upon potential awards such as can be offered only in a free society. . . . If we expect in this or any other country to gain the benefits of technological advances, we must preserve the human willingness and desire to put those advances into practical application."

Additional papers were presented as follows: "The Future of American Standards," by Vice Admiral G. F. Hussey, Jr. (U.S.N. Ret'd), secretary, American Standards Association; "Status of Hydraulic Standards," by J. Robinson, chief engineer, Vickers, Inc.; "Machine Tool Builders of Tomorrow," by J. Edward Goss, industrial activities administrator, Brown & Sharpe Mfg. Co.; "Training Machine Tool Salesmen," by James C. Hebert, general sales manager, Jones & Lamson Machine Co.; and "Conditions of a Dynamic Economy," by William J. Kelly, president, Machinery and Allied Products Institute.

David Ayr, president and general manager of the Hendey Machine Co., Torrington, Conn., assumed his duties as the new president of the National Machine Tool Builders' Association, following his election at this meeting. Richard E. LeBlond, president of the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, was elected first vice-president and Frederick S. Blackall, Jr., president of the Taft-Peirce Mfg. Co., Woonsocket, R. I., was elected second vice-president. Jerome A. Raterman, president of the Monarch Machine Tool Co., Sidney, Ohio, was elected treasurer. R. W. Glasner, president of the Clearing Machine Corporation, Chicago, Ill., Mr. Blackall, and Mr. Raterman were elected directors for three-year terms.

* * *

First United States International Trade Fair

The first United States International Trade Fair, patterned after the world-famous Leipzig and Antwerp fairs, will be held in Chicago August 7 to 19, 1950. One million square feet in Chicago's largest exhibition halls will house the Fair. Products made by manufacturers in the United States and abroad will be on display, classified under twenty-nine trade categories, including consumer and industrial commodities.

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

Springfield Heavy-Duty Lathe of Entirely New Design

The Springfield Machine Tool Co., Springfield, Ohio, has brought out a 16-inch heavy-duty Model S lathe of entirely new design to supplement its line of Series 180 machines. This lathe has been especially designed to provide maximum rigidity and operating convenience, combined with broad feed and speed ranges which adapt it for all types of work. The lubrication facilities have been carefully designed to minimize wear and maintenance. Both tool-room and engine lathe accessories and attachments are available for the new lathe, including profile, contour, and various special units developed by the manufacturer.

The exceptionally heavy spindle is mounted on three heavy-duty bearings. Either ball or roller type spindle bearings can be provided. The spindle can be furnished with a center hole slightly larger than 2 inches in diameter when required. The regular heavy hardened and ground gears give a spindle speed range of 15 to 1000 R.P.M., but gears for higher or lower ranges can be furnished. The spindle is controlled by a multiple-disk combination clutch and brake, which runs in an oil bath. Mechanical reverse to the spindle can be had when required.

Two levers control the twenty-four speed changes, one lever having two shifts while the other controls twelve gear changes. The shifter mechanism permits shifting directly from one speed to any other speed.

Lubricant for all bearings and gears is carried in an oil sump in the cabinet leg, an automatic pump serving to flood the entire mechanism with oil. A self-cleaning oil filter is located in the front of the cabinet leg.

The combination quadrant gearing and sixty feed and thread gear-box changes provide for a quick change-over from standard operations to metric, module, and diametral pitch set-ups. In addition, the sixty-feed gear-box provides for cutting all standard threads. Any of the optional ranges provides for cutting 11 1/2- and 27-pitch threads. Four levers control all the sixty gear changes. The feed gearing is completely enclosed. Oil cascades through the gears and bearings from the headstock down into the cabinet leg.

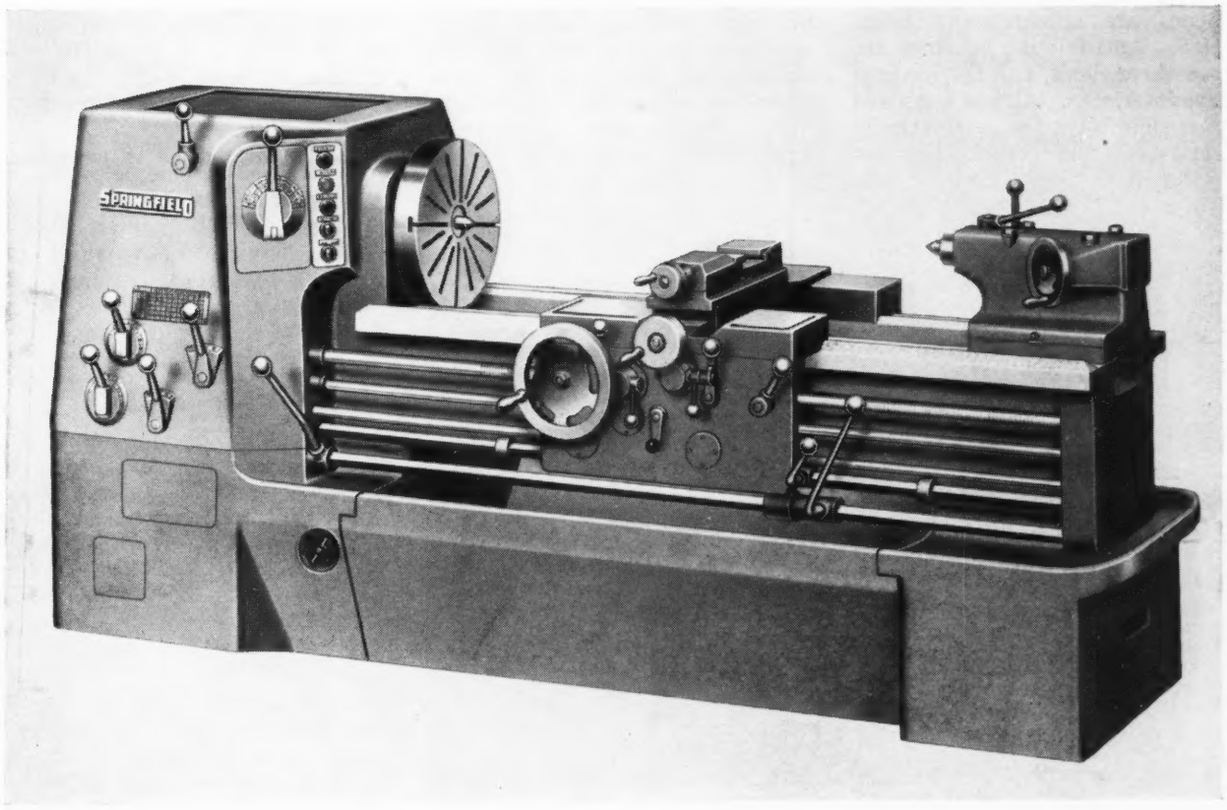


Fig. 1. Heavy-duty lathe of radically new design announced by the Springfield Machine Tool Co.

To obtain additional information on equipment described on this page, see lower part of page 224.

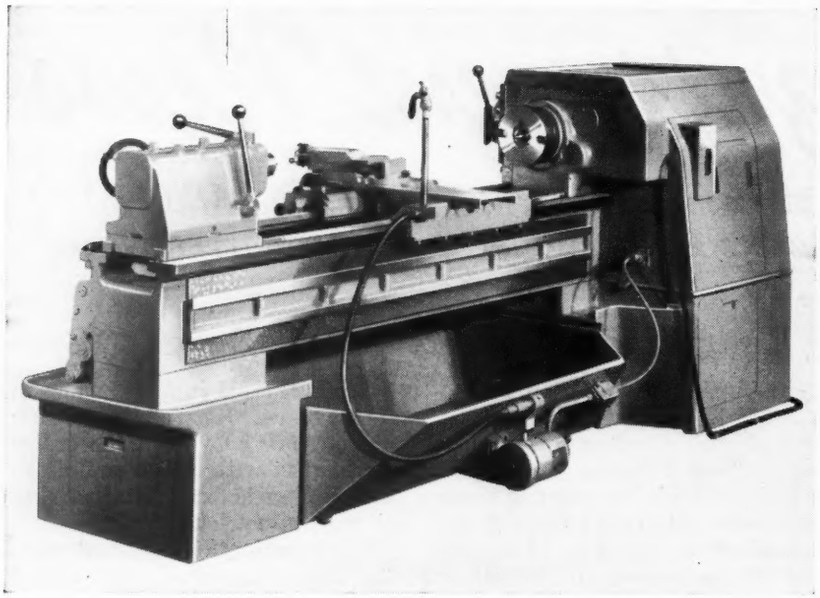


Fig. 2. Rear view of new Springfield heavy-duty lathe

The wide, deep bed with new triangular type girthing gives extra chip clearance through the bed, and has proved by tests to be from four to ten times as rigid as previous designs. Beds are available with replaceable hardened tool-steel way inserts.

The gearing and new positive-action friction feed clutches in the apron, as well as the cross-slide and carriage rapid traverse mechanism, are automatically lubricated. Anti-friction bearings are used throughout, and the controls have interlocks. All bed ways and cross-slide ways are automatically lubricated and the cross-slide ways are completely guarded from chips.

Extra large non-ferrous half-nuts engage the heavy lead-screws. Both the lead-screws and the large feed-rod are of the constantly rotating type. The heavy-duty compound-rest screw and cross-slide screw are so located as to eliminate interference between the large micrometer dials. The compound rest swivels 360 degrees. The unique tailstock, with the handwheel offset 50 degrees toward the operator as shown in Fig. 1, has two-speed action, for slow drilling feeds and rapid advance. Means for both heavy-duty clamping and quick-acting light-duty clamping are provided.

The full-depth chip and coolant pan is independent of the machine, and rests on ball casters which permit it to be easily rolled out for cleaning or for positioning it to suit the operator's convenience. The coolant pump is mounted at the rear of the pan and has "quick-disconnect" type hose and electrical couplings, as shown in Fig. 2. Rapid-traverse and main-drive motors are mounted in the cabinet leg. A removable panel gives free access to the motors.—61

Cleveland Automatic Shear with Loading Table, Automatic Uncoiler, Roll Feed, and Stacker

The Cleveland Punch & Shear Works, Cleveland 14, Ohio, has brought out an automatic shear provided with a loading table, automatic uncoiler, roll feed, and stacker, all arranged and synchronized to operate as a complete unit. The single-geared shear is equipped with an electrically controlled air-operated jaw type clutch, and is designed to operate at a speed of sixty strokes per minute. The number of cuts which can be made in a given time is variable, however, due to the time required for feeding and measuring the stock.

The loading table is arranged

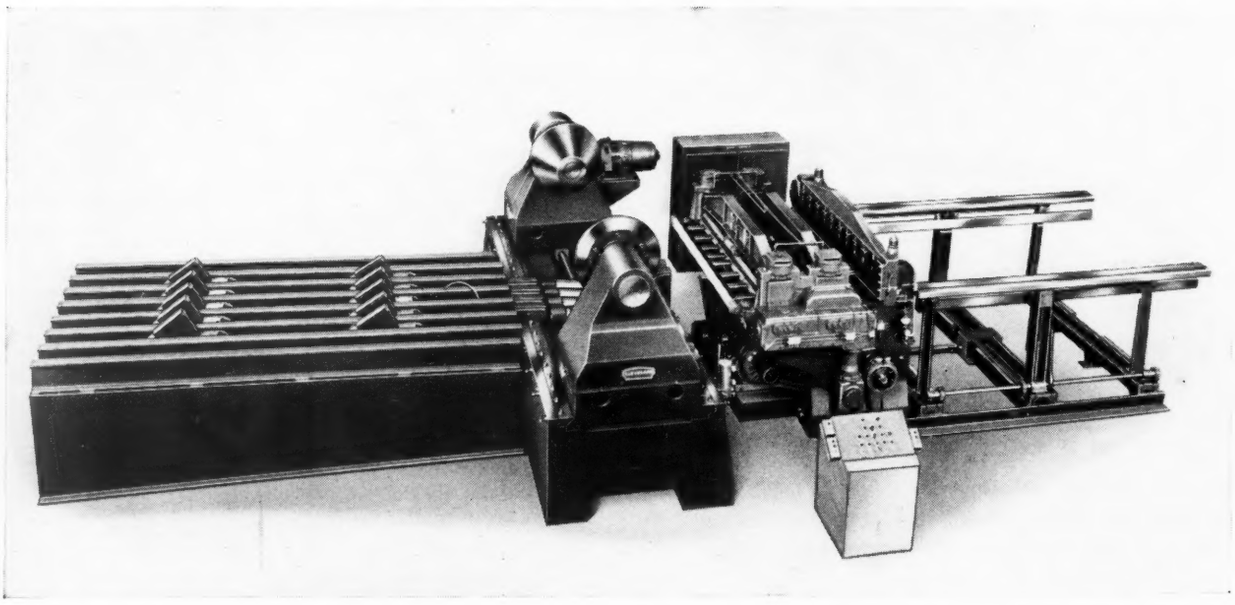


Fig. 1. Automatic shear developed by Cleveland Punch & Shear Works for handling large rolls of coil stock

To obtain additional information on equipment described on this page, see lower part of page 224.

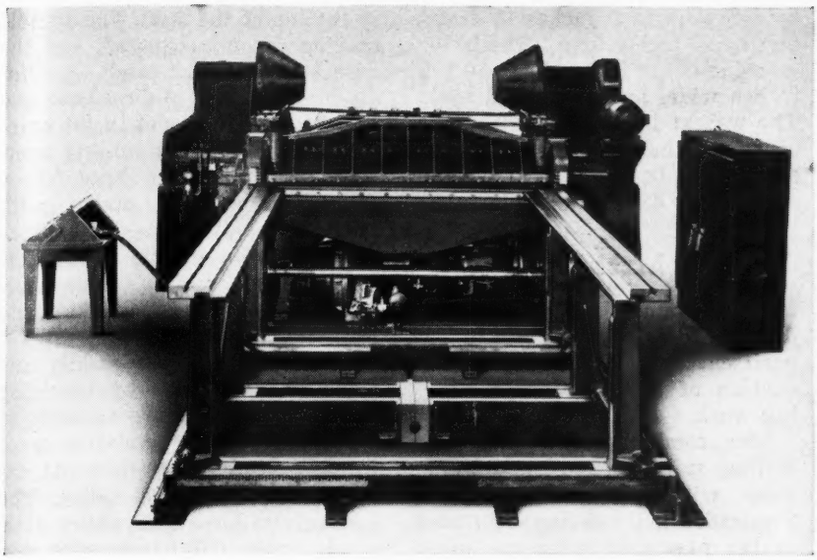


Fig. 2. End view showing shear and stacker of Cleveland automatic shear

to accommodate two coils of stock at a time, the coils being advanced, one at a time, by a gravity feed. When the first coil comes in contact with the stops on the uncoiler unit, it is located below the cones on which it is to be mounted and rests on an elevator. The elevator, controlled by either a hand or electrically operated hydraulic valve, is manipulated until the coil is properly centered in relation to the ends of the uncoiler cones.

After the first coil has been positioned, the second coil is permitted to roll down to the stops on the uncoiler unit. Another coil can then be placed on the table.

The automatic uncoiler is designed to accommodate coils from 12 to 96 inches wide, with an outside diameter of 72 inches and an inside diameter of 16 to 30 inches, and having a weight of 20 tons. Both the uncoiler cones can be individually adjusted to take the minimum or maximum width of coils, and they can be used, when necessary, to center the coil on the machine. They are provided with limit switches for both the "in" and "out" positions. A limit switch also controls the variable-speed motor that operates the driving cone to prevent too large a loop or slack in the stock, and also to keep the uncoiler from feeding too much material into the roll feed.

The roll-feed unit consists of five straightening and four feed rolls. Because of the length of the rolls, they are supported by "back up" rolls which act as stiffeners when wide material is being straightened. An oiling roller is also provided for coating the material with a protective covering.

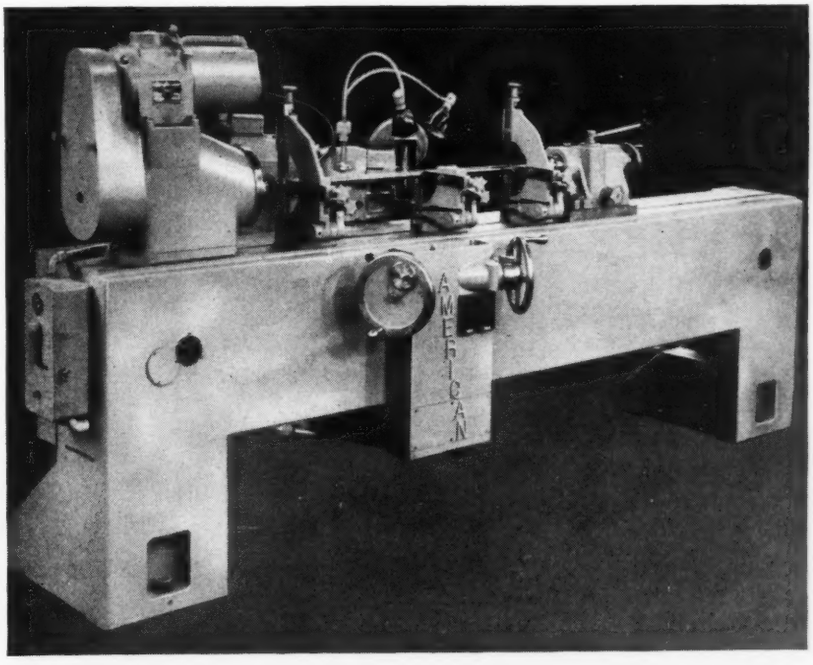
The automatic roll feed is arranged with an electrically controlled Cleveland drum type clutch having a spring-actuated brake, and is equipped with a variable-speed automatically controlled measuring device, which can be set for shearing material from 12 to 148 inches in length.

Both sides of the stacker unit are adjustable by means of hand ratchets, and can be set to correspond with the width of material being sheared. As each sheet is cut off, it is fed onto two horizontal rails. These rails are automatically released through a lever connected to and synchronized with the shear, and upon release, permit the sheets to drop on a platform for easy removal.....62

American Broach Sharpening Machine

A new type of cylindrical broach sharpening machine in which the broach is mounted between centers on a stationary bed and the grinding wheel is traversed from tooth to tooth has been developed by the American Broach & Machine Co., Division of Sundstrand Machine Tool Co., Ann Arbor, Mich. This machine is designed for rapid, accurate sharpening and resharpening of internal broaches, such as are used to produce involute and helical splines; hexagonal, cam, and irregular-shaped holes; serrations; and internal surfaces requiring combination type broaches.

The stationary bed mounting for the broach has the advantage of eliminating over-travel on the ways, with the result that a considerable saving in floor space is obtained. Other outstanding features include micrometer-dial control wheels for the lateral traverse of the carriage and in-feed of the grinding spindle; variable-speed drive for rotation of the



Broach sharpening machine brought out by the American Broach & Machine Co.

To obtain additional information on equipment described on this page, see lower part of page 224.

broach; and anti-friction bearing rollers.

The machine is built in two sizes for the resharpening of round type broaches, the larger size handling broaches up to 9 inches in diameter by 84 inches long, while the smaller size takes broaches up to 9 inches in diameter by 60 inches long. The latter machine is 110 inches long, 50 1/2 inches wide, and 58 inches high. The weight is 4500 pounds. The other machine has the same width and height, but is 122 inches long, and weighs 4800 pounds.....63

Cleereman Lay-Out Drilling Machine

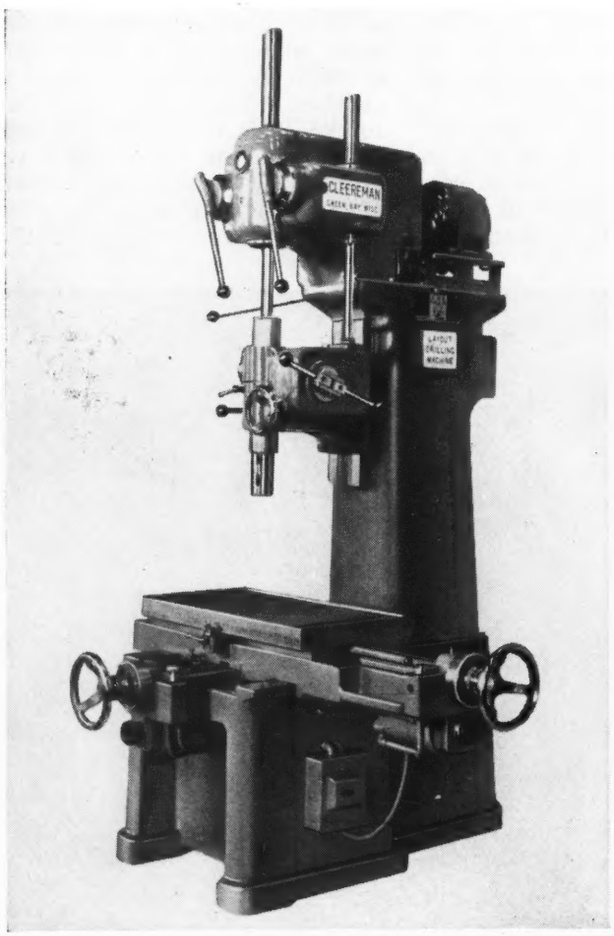
A new lay-out drilling machine has been developed to handle work that requires a higher degree of accuracy than can be obtained with a drilling machine and yet does not need the extreme precision of a jig borer. This machine, manufactured by the Cleereman Machine Tool Co., Green Bay, Wis., is being sold by the Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago 6, Ill. It has been designed to provide maximum convenience in performing drilling, boring, tapping, reaming, milling, and similar operations. The machine is especially applicable to tool work, including the making of plastic, rubber, or die-casting molds and blanking, punching, forming, and drawing dies, as well as to experimental work and jigless production of small-lot manufacturing work.

The combination boring and drilling spindle has a No. 4 Morse taper with lifetime lubrication. Pre-loaded ball bearings are used at the nose end, with an upper steadying ball bearing and a coupling type connection between the spline shaft and the spindle in the top of the quill. The spindle quill is chromium-plated, and the rack is of 1/4-inch pitch. A spindle binder on the sliding head and the retaining key slot in the spindle nose provide for milling operations. The sliding head has a friction type feed clutch with automatic, adjustable-depth "kick out," and the spindle is counterbalanced to eliminate backlash between the spindle feed rack and pinions.

Movements of the saddle and table are controlled by precision lead-screws which are accurate to 0.0001 inch; the cumulative error in these lead-screws does not exceed 0.001 inch in 24 inches. The lead-screws have micrometer dials graduated to 0.001 inch, with verniers reading to 0.0001 inch. Power rapid traverse for the table is optional. 64

Lake Erie Hydraulic Metal-Working Presses

The Lake Erie Engineering Corporation, 325 Woodward Ave., Buffalo 17, N. Y., has just announced a new series of hydraulic metal-working presses having capacities of 100, 150, and 200 tons. These Series DF presses have been designed to meet the demand



Cleereman lay-out drilling machine introduced by Bryant Machinery & Engineering Co.

Hydraulic metal-working press developed by the Lake Erie Engineering Corporation

To obtain additional information on equipment described on this page, see lower part of page 224.

for low-cost, single-action, utility and forming presses, with or without cushions. Each press can be furnished in four combinations as follows: Single-action normal-speed, with hand-lever operation; single-action with cushion, normal-speed, hand-lever operation; single-action with high-speed push-button operation; and single-action with cushion, high-speed push-button operation.

Operation is governed by the pressure-control handwheel, operating lever, motor controls, and a hydraulic gage mounted on the instrument panel. The motor controls include start and stop buttons and an indicating light. The pressure gage is calibrated in tons as well as pounds per square inch line pressure.

The operating lever has three positions, the center one being neutral. Moving the operating lever to the left causes the press platen to descend rapidly until it encounters the resistance of the work, at which point the pressure will build up to the predetermined point set by the pressure-control handwheel. This pressure will be maintained while the operating lever is held in this position.

When the hand-lever is moved to the right, the press platen rises. It can be stopped at any point by moving the lever to the neutral position. The approach and return speeds of the platen are also controlled by the lever.

The three sizes of presses have platens 28, 36, and 48 inches square, respectively; daylight openings of 24, 32, and 48 inches; strokes of 16, 22, and 28 inches; shut heights of 8, 10, and 20 inches; motors of 5, 7 1/2, and 10 H.P.; heights of 10 feet 2 inches, 12 feet 4 inches, and 14 feet 7 inches; and weights of 13,000, 21,000, and 37,500 pounds. 65

LeBlond Hollow-Spindle Lathe

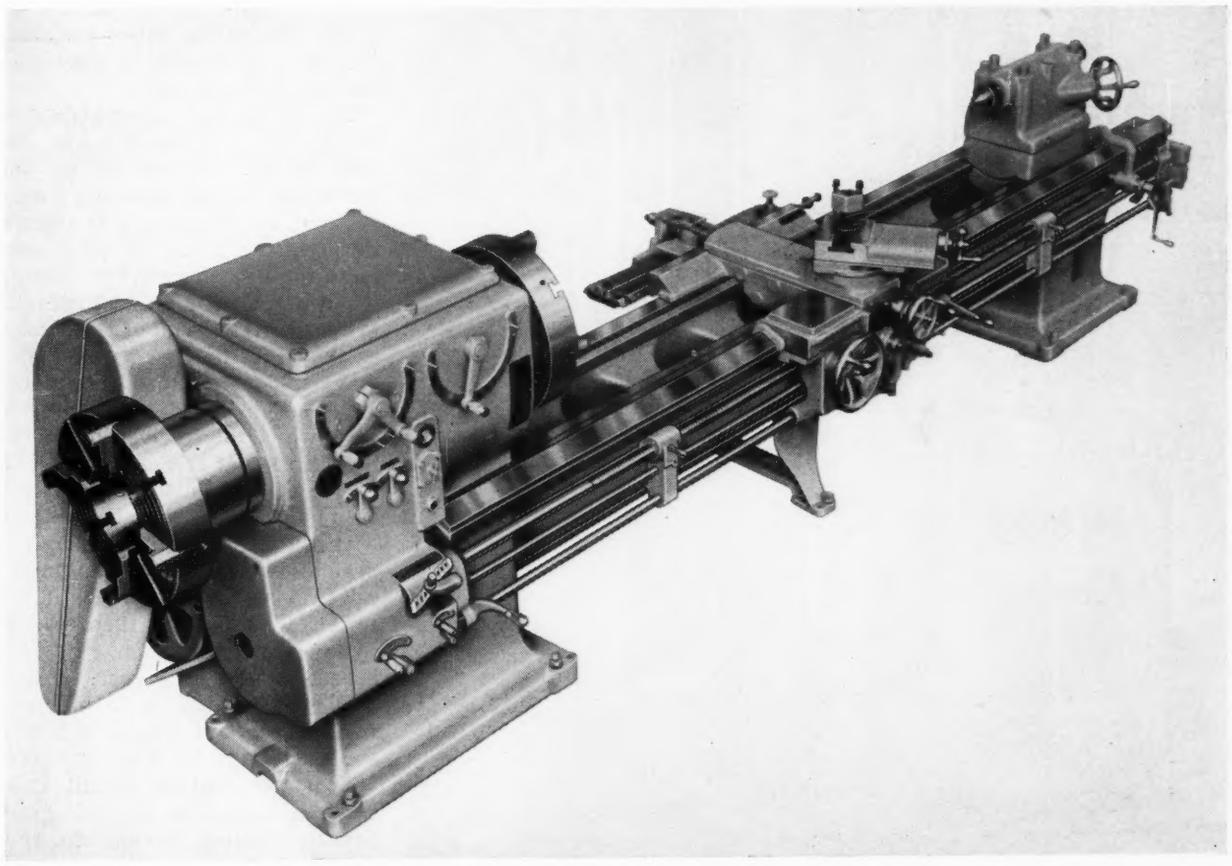
A hollow-spindle lathe with 9-inch bore, especially adapted for use in the oil and steel industries or wherever a large opening through the spindle is required, has just been announced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. The new lathe, although rated as a 20-inch size, will swing 27 inches over the bed and carriage wings, and is available with center distances starting at 48 inches. It has an eighteen-speed geared headstock, and can be driven by a 20-H.P. motor.

The eighteen spindle speeds range from 10 to 362 R.P.M. An electric brake with apron spindle control provides for starting, stopping, and reversing the spindle, giving faster spindle response and thus reducing operating time.

The quick-change feed-box is totally enclosed, automatically lubricated, and provides sixty-three feed and thread changes. Other advantages include hardened and ground steel bed ways, front and rear; one-piece apron with positive jaw-feed clutch; thrust-lock tailstock; and chucking facilities provided at both ends of the hollow spindle 66

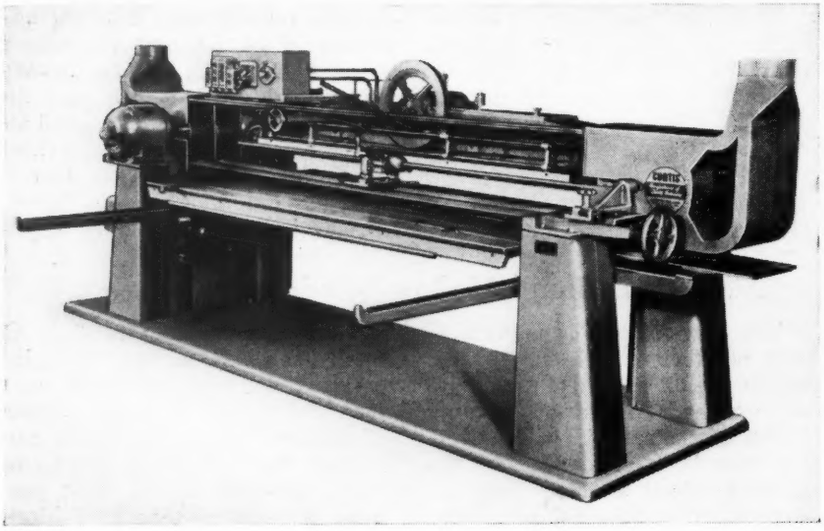
New Equipment for "Press-Rite" Press

The Sales Service Machine Tool Co., 2363 University Ave., St. Paul 4, Minn., announces that the Model 0 5-ton "Press-Rite" press is now available with anti-friction roller bearings in the flywheel, a



Hollow-spindle lathe built by the R. K. LeBlond Machine Tool Co.

To obtain additional information on equipment described on this page, see lower part of page 224.



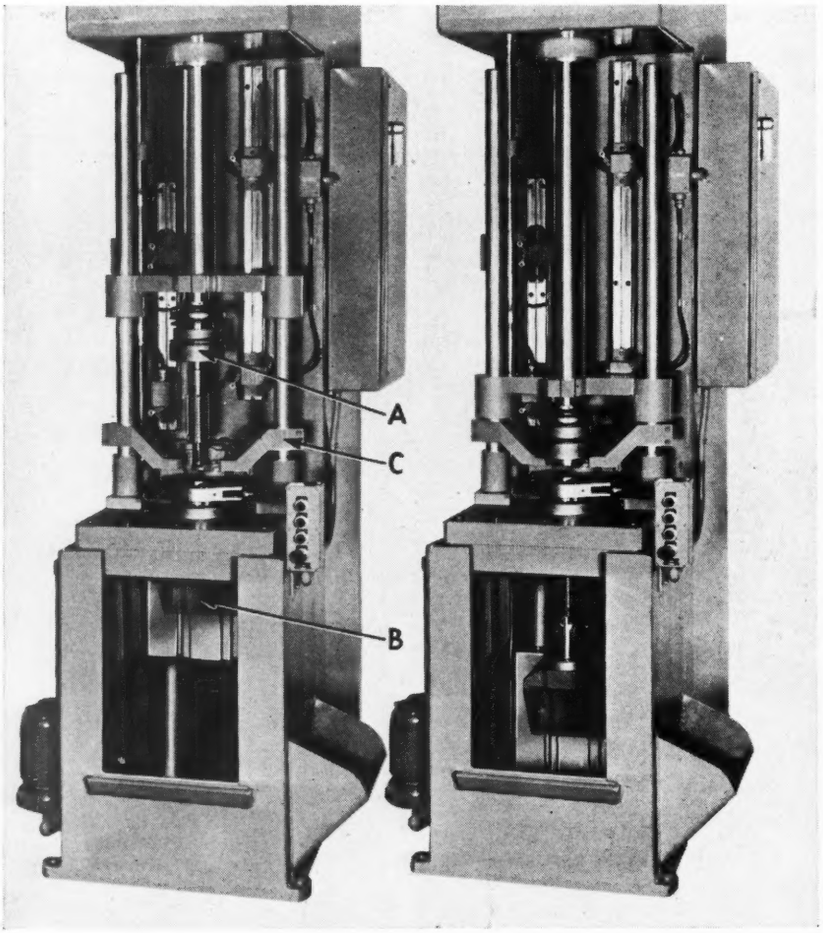
Curtis double-belt hydraulic-stroke sander

cam-actuated brake, and a new type connecting-rod, as well as the exclusive "Press-Rite" non-repeating safety mechanism. The semi-steel one-piece cast frame provides extra rigidity and strength. This press weighs approximately 300 pounds without the motor.....67

Curtis Double-Belt Hydraulic-Stroke Sander

A new double - reversible - belt, hydraulic-stroke sander has been introduced to the metal-working industry by the Curtis Machine Division, Lincoln Park Industries, Inc., Jamestown, N. Y. The speed of this heavy-duty polishing and sanding machine is infinitely variable up to 250 strokes per minute. An automatic adjustment of the stroke length from 16 inches to 8 feet can be accomplished without stopping the machine.

The two belts, each driven by a separate motor, are independently reversible and may be used interchangeably without stopping the machine or removing the work from the table. This permits roughing and finishing operations to be performed in one set-up. All controls are grouped on a compact panel within easy reach of the operator. 68



Colonial press set up with new broach-handling equipment

Automatic Broach-Handling Equipment for Colonial Presses

The Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich., has announced that automatic broach-handling equipment is now available on its complete standard line of presses ranging in size from 4 tons, 24-inch stroke, up to 10 tons, 36-inch stroke. The broach-handling mechanism consists of an automatic release type puller *A* and a lower receiver *B*. In the view at the left of the illustration, the broach is shown at the top of its stroke.

The particular press shown is the standard Colonial 6-ton, 36-inch stroke machine set up for finishing casehardened gear splines. As the broach is pushed through the gear, its pilot contacts the broach receiver, forcing it down against a slight hydraulic pressure. At the end of the stroke, as shown in the view at the right, two trip-dogs *C* cause the broach-puller *A* to release the broach, after which the receiver lowers the broach so that it clears the work.

When the finished part has been unloaded, the broach receiver, with the broach, is raised by hydraulic pressure, thus automatically reinserting the broach in the puller. The machine then returns to the starting position, ready for broaching the next gear. Operation of the swinging fixture used for this work is interlocked with the machine cycle. A separate control is provided to permit independent operation of the lower broach-handling mechanism, thus facilitating set-up of the press for a new job. 69

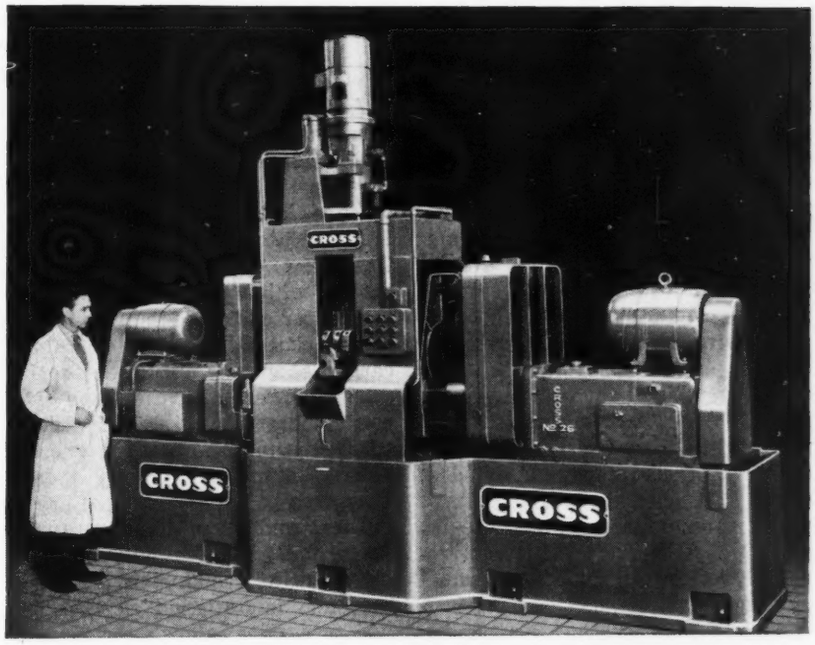
To obtain additional information on equipment described on this page, see lower part of page 224.

Cross Special Machine for Processing Axle Shift-Forks

The Cross Company, Detroit 7, Mich., has recently built a special machine for the Axle Division of the Eaton Mfg. Co., Cleveland, Ohio, which is designed to machine axle shift-forks for two-speed truck axles. The machine performs twelve different operations on eighty-seven pieces per hour when attended by only one unskilled operator.

Four stations are provided, the first station being used for loading and unloading; the second for drilling the large and small holes in the boss of the shift-fork; the third for reaming the large hole and milling two bosses and the slot in the shank; and the fourth for drilling and reaming two holes in the fork while spot-facing and chamfering the ends of the large hole.

The machine is designed to handle parts of eight different sizes. Standard Cross sub-assemblies are utilized in this machine to provide flexibility for part design changes and also to facilitate maintenance. Other features include a fluid motor drive for power indexing, hydraulic feeds, and automatic working cycle. 70



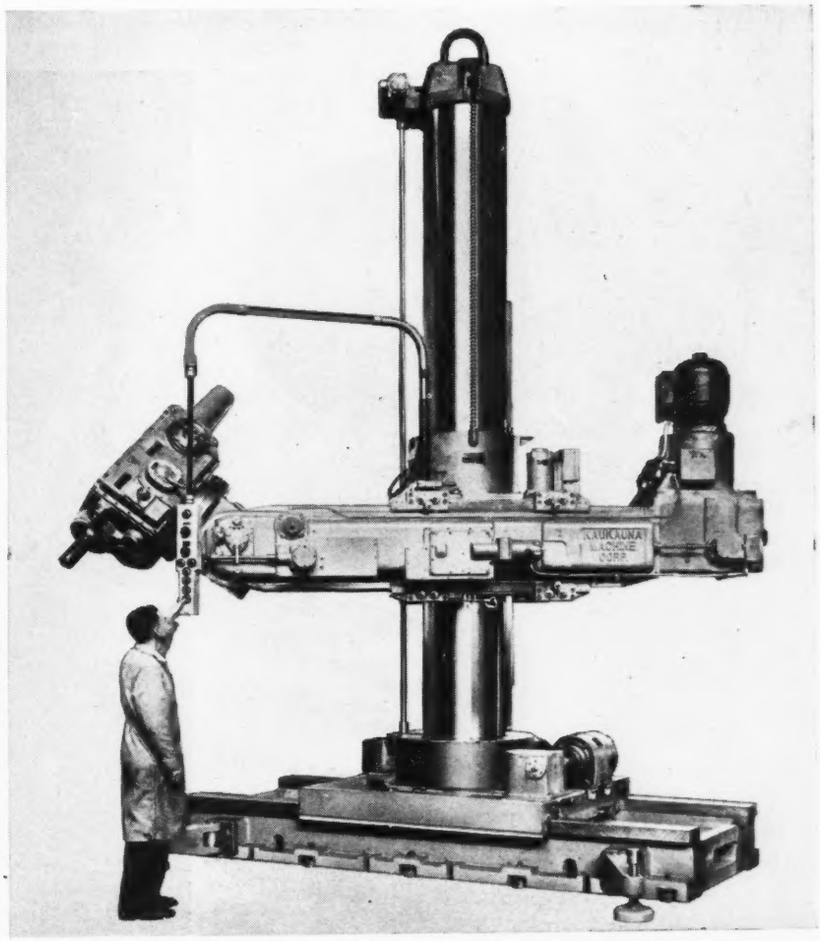
Machine for processing axle shift-forks built by The Cross Company

Kaukauna Heavy-Duty Universal Drilling and Tapping Machine

A heavy-duty, universal drilling and tapping machine having a radial capacity or reach of 97 inches when the spindle is in the vertical position is being manufactured by the Kaukauna Machine Corporation, Kaukauna, Wis., and introduced on the market by the Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago 6, Ill. With the spindle in a horizontal position, holes can be drilled at any point from 18 to 134 inches above the floor. The machine is designed to perform drilling, tapping, boring, spot-facing, or reaming operations in horizontal, vertical, and angular positions on a production basis, and can be supplied for stationary applications or for use as a portable unit.

This machine has a 4-inch diameter nitrided spindle with a manual and power feed of 18 inches; either a No. 5 or No. 6 Morse taper hole; and nine speeds in a choice of three ranges from a minimum of 25 R.P.M. to a maximum of 800 R.P.M. with a spindle drive power from 10 to 20 H.P.

The spindle head swivels 360 degrees on the trunnion, and the trunnion rotates 180 degrees on the rails. Both swiveling units



Kaukauna heavy-duty universal drilling and tapping machine

To obtain additional information on equipment described on this page, see lower part of page 224.

are power-driven, with controls located in the pendent station. The rails supporting the swiveling spindle head and trunnion have a power-driven horizontal traverse of 36 inches for rapid tool positioning, handwheels being used for final, accurate positioning.

The entire rail unit, carrying the spindle head, spindle drive, and transmission, has a vertical movement of 60 inches on the column, with power rapid traverse up and down. Controls in the pendent station provide for "inching." The column that carries the rail unit is 22 inches in diameter, can be swiveled through 360 degrees to permit machining at any point around the machine, and is provided with an electric swivel clamp which eliminates off-position creep.

The column base has a horizontal movement of 48 inches by power, with both rapid traverse and "inching" in either direction. Nine spindle speeds and nine spindle feeds are obtainable by dual rotary selector levers. Additional travel of any of the units can be provided to increase the range as required. ---- 71

Rousselle Deep-Throat Press

A 25-ton No. 3-G deep-throat press has been added to the line of standard and special punch presses manufactured by the Service Machine Co., 7627-33 S. Ashland Ave., Chicago 20, Ill. This new press has an 18-inch throat, which permits working to the center of 36-inch sheets, making it especially useful in fabricating shops, as it increases the scope of press operations, as well as saving time and material through the use of wider sheets.

The standard bolster plate measures 14 by 20 inches. Larger bolsters and punch-holders can be furnished. The frame is an extra heavy, reinforced, semi-steel casting, and is designed so that the bed protrudes, allowing clearance for some jobs that ordinarily would require horn type presses.

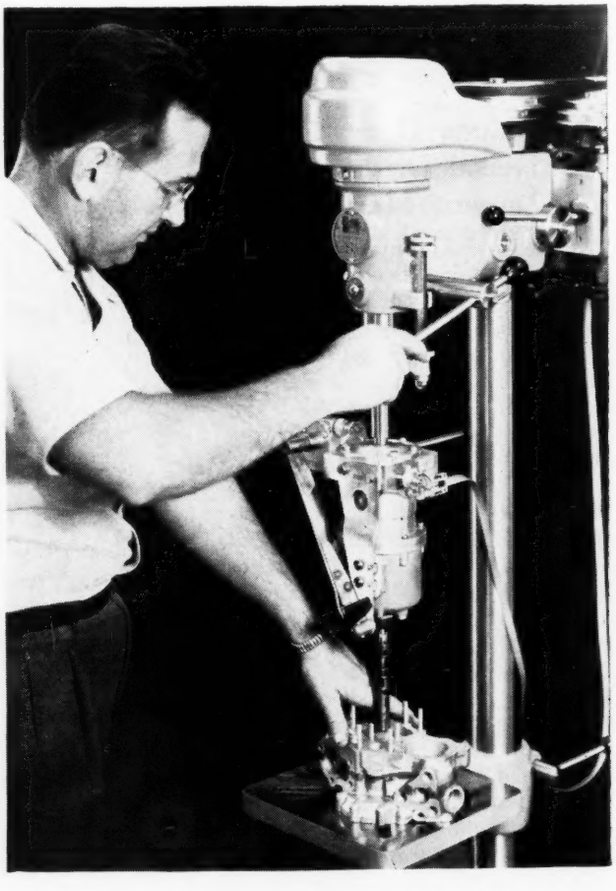
This press is equipped with a single-stroke or continuous clutch, a roller-bearing flywheel, and extra long hardened and ground ways. It operates at a speed of 125 R.P.M., and weighs approximately 3200 pounds. ---- 72

Torque Indicating Stud-Driver

A power-driven torque indicating stud-driver, designed to increase production and maintain uniform torque, has been developed by the Industrial Engineering Co., 730 E. Sample St., South Bend 18, Ind. This tool is capable of driving studs having right- or left-hand 1/2-13 threads. It can be used on any drill press, air motor, or electric drill. Any torque desired can be maintained.

While driving a stud, the operator watches two small signal lights on the front of the tool. A green light will glow until the predetermined torque has been attained, at which time the light goes off and the stud is properly set. Should the stud be driven too tightly, a red light will glow. The range between the green light (too loose) and the red light (too tight) is adjustable and is set by a knurled screw. A calibrated torque wrench attached to the stud-driver is used as a standard. During the driving operation, the wrench indicates the torque being used to drive the stud. ---- 73

Rousselle 25-ton deep-throat press



Power-driven torque indicating stud-driver

To obtain additional information on equipment described on this page, see lower part of page 224.

Wilson Hydraulically Operated Combination Press-Broach

K. R. Wilson, 215 Main St., Buffalo 3, N. Y., has announced a combination press-broach particularly well adapted for use in small plants. This machine is designed for "push-pull" operation in either the vertical or horizontal position. It is available in 25-, 50-, and 60-ton capacities. When used as a broaching machine, tonnages can be varied from 1 ton to the full capacity of the press. The ram stroke varies from 7 to 54 inches; ram speeds and top tonnage pressure depend on the type and capacity of the motor and hydraulic pump equipment, of which ten different units are available.

The pressure gage, located at eye level, is equipped with a pressure dampener to prevent damage resulting from sudden pressure drops. A pressure regulating valve permits selection of any pressure within the rated capacity. A manually operated four-way valve permits instant and precise finger-tip control of the ram. The hydraulic system has a 20-gallon capacity reservoir fitted with seamless steel tubing. Location of the pumping unit may be either in the base or at the top of the machine. All electrical controls are standard. Cutting oil is supplied through an independently motorized coolant pump from a 15-gallon reservoir.

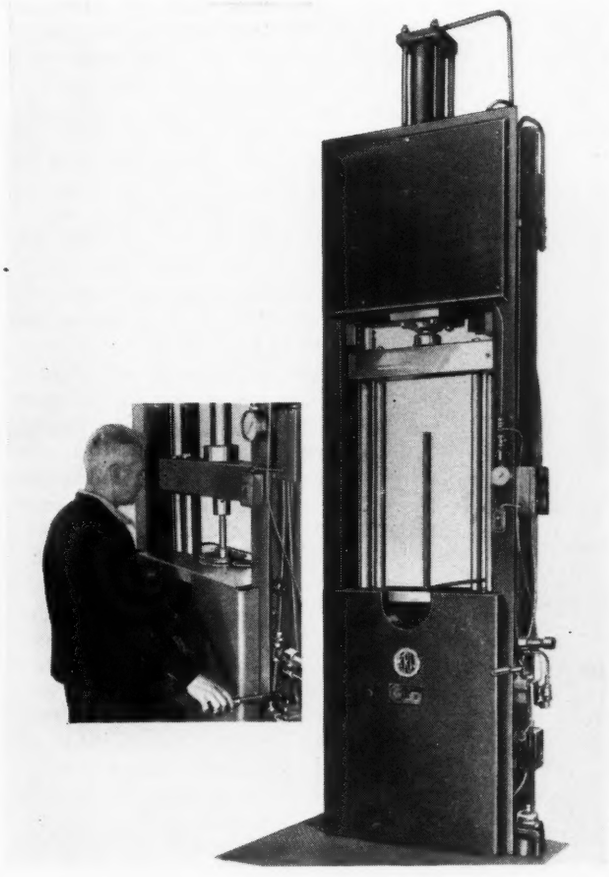
For push-broaching, an adapter is screwed into the upper cross-bar, and the broach is inserted and held by a slot and key. For pull-broaching, a similar adapter is inserted in the lower cross-bar. A flat-nosed adapter is furnished for attachment to the upper cross-bar to handle various types of pressing and forming work.....74

Reed-Prentice Vertical Automatic Production Lathe

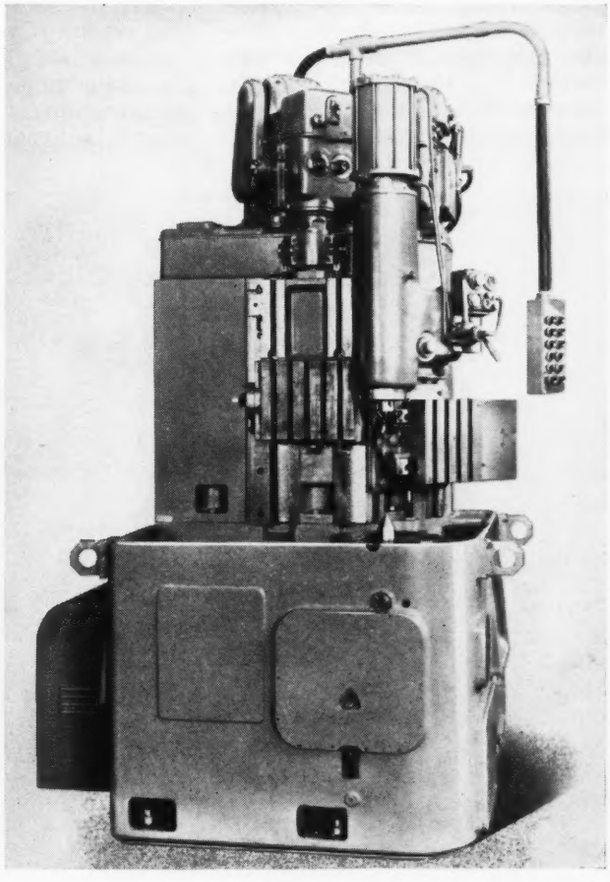
A vertical automatic production lathe, designed to use high-speed negative-rake cutting tools to their full advantage for turning, boring, and facing work, has been developed by the Reed-Prentice Corporation, Department Y-11, Worcester 4, Mass. The new lathe is controlled by a central cycle timer which, after the work has been chucked, starts the spindle, actuates each slide at its appointed time, and when the last tool has completed its work, stops the spindle.

The lathe is of unit construction throughout. The slides are independent of each other, and may be set into motion at any time during a machine cycle. Feed-boxes for each slide are identical, and each is complete with motor, hydraulic system for shifting the clutches, and solenoid-operated valves. The feed-boxes permit traverse of the tools to the cutting position, feed, stop, dwell, return, and then stop for removal of the work-piece.

When setting up the machine, all movements can be controlled by push-buttons conveniently located in a pendent panel. A switch selects the slide to be moved; then by means of a plainly marked push-button, the slide may be moved at the feed rate or rapid traverse in either direction, as required. The tools may be fed into a cut and actual work per-



Hydraulically operated combination press-broach



Reed-Prentice vertical automatic production lathe

To obtain additional information on equipment described on this page, see lower part of page 224.

formed as a final check on the tool set-up.

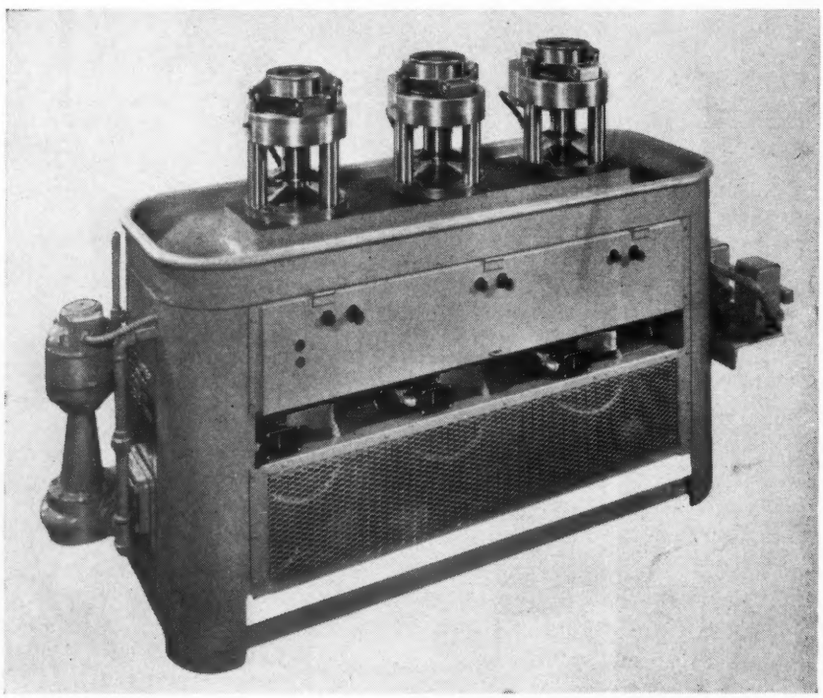
The machine is equipped with one turning slide, one facing slide (arranged to swivel), and a tailstock, which may be replaced with a boring head when needed. It is designed to permit adding an extra slide, as well as attachments for taper-turning or forming and other types of work. The machine is 70 inches long, 65 1/2 inches wide, and 113 inches high.....75

"Tapmaster" Automatic Tapping Machine

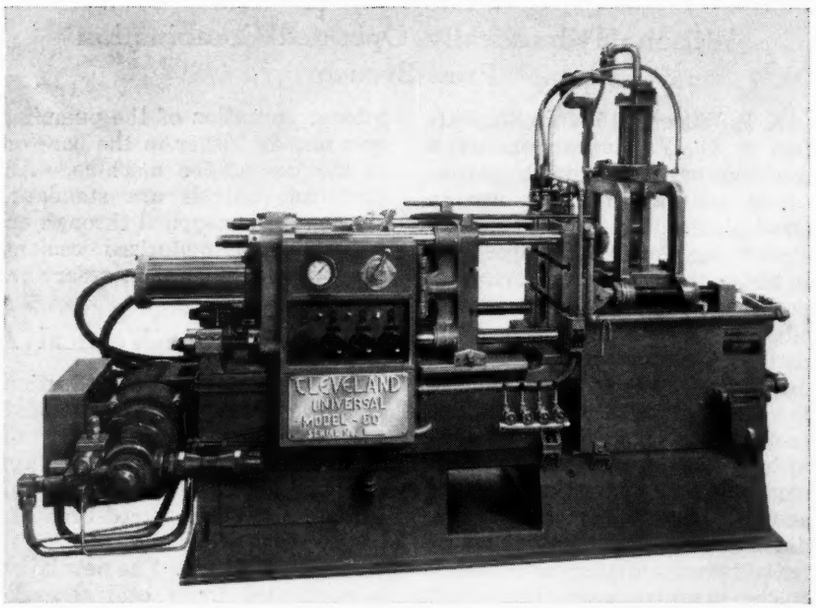
The line of automatic tapping machines manufactured by the D. H. Prutton Machinery & Tool Co., 5295 W. 130th St., Cleveland, Ohio, has recently been expanded by the addition of a No. 40 "Tapmaster." This machine is designed to handle collapsible taps, ranging from 1 1/2 to 4 inches in size, of the type used in tapping gas cylinder caps and large pipe fittings.

Although similar in appearance to previous solid tap machines, the new "Tapmaster" embodies several changes, the most notable being cam actuation of the taps instead of the conventional lead-screw arrangement. This feature permits a rising movement after the tapping operation, so that facing and chamfering of the lower surface of the work can be accomplished by tools attached directly to the tap. In this way, the machining of the bottom surface —usually a separate operation in itself—is performed during the tapping cycle.

Air fixtures for holding the work are made to suit each individual job. These fixtures clamp the work before the tap enters, hold it during tapping and facing, and release it when the operation is completed. The time allowance for changing pieces is three to five minutes when the machine is operating automatically. 76



Automatic tapping machine made by the D. H. Prutton Machinery & Tool Co.



Hydraulic die-casting machine built by the Cleveland Automatic Machine Co.

Cleveland Universal Die-Casting Machine

A high-pressure hydraulic die-casting machine, designed to meet the demand for a small, rugged, low-cost machine, has been announced by the Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio. This new Model 50 machine retains many of the features of the company's Models 200 and 400 machines. It can be furnished either as a cold-chamber type for casting aluminum or as a gooseneck type for casting zinc, tin, or lead. The one-shot end of the machine can be quickly and easily removed and changed to the other type.

The machine is equipped with a Vickers two-stage pump driven by a 10-H.P. motor.

Either automatic or manual controls can be supplied. The automatic controls provide a flexible, fool-proof, electrically operated means of controlling the machine, which can be timed to the exact die-casting cycle desired. This control can be operated manually.

The machine has die-plates which are 22 by 18 inches and four tie-bars 2 inches in diameter. The space between the tie-bars is 16 by 12 inches and the die opening is 8 inches. The estimated 50 tons locking pressure is obtained by a toggle mechanism.

Aluminum castings up to 2 1/2 pounds and zinc castings up to 4 pounds can be produced. The free cycle time of the machine is well over 1000 shots per hour.....77

To obtain additional information on equipment described on this page, see lower part of page 224.

Built-In Rotary Table Type Boring, Drilling, and Milling Machine

A horizontal boring, drilling, and milling machine with a built-in rotary table has been placed on the market by the Cincinnati Gilbert Machine Tool Co., Cincinnati 23, Ohio. Outstanding features of this machine are a single hardened 3 1/2-inch diameter spindle, which has a maximum speed of 1420 R.P.M.; built-in reversing motor; spindle sleeve mounted on pre-loaded "Zero Precision" ball bearings; pressure lubrication to all running parts; and centralized control for spindle speeds, feed changes, and feed selection.

The built-in table unit has a cross feed and power rapid traverse on the saddle. The top of the table is clamped to the base by a 47-inch diameter ring acting on an angular surface of the table top.

The table top is mounted on a very large diameter anti-friction bearing, and is centered on a large-diameter king-pin, equipped with opposed tapered roller bearings. The flat ways are lubricated by a pressure system, thus making it easy to revolve the table top by hand, even when carrying heavy loads. The table top has a working surface 44 inches in diameter or 44 inches square, and is surrounded by a coolant trough. The cutter coolant passes through the table to the base and then through the saddle to the bed; thus the coolant is confined to the machine. The table top is graduated to read to 1/2 degree, and can be equipped with a precision indexing device.

The machine can be arranged to permit the table to be revolved by hand alone or by a hand-actuated Hindley type worm and wormwheel. It can also be furnished with sixteen power feeds and rapid rotation of the table through power from the main feed.

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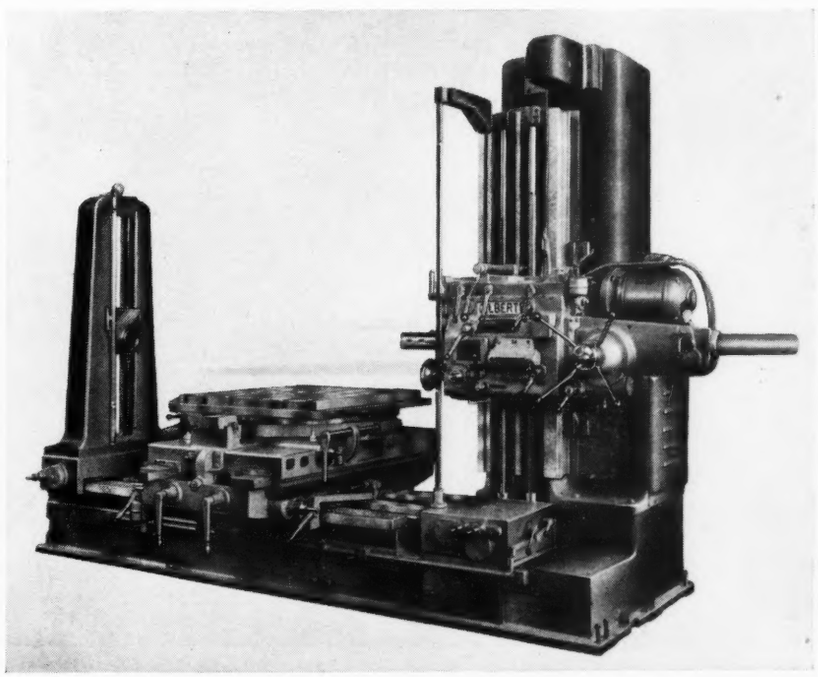
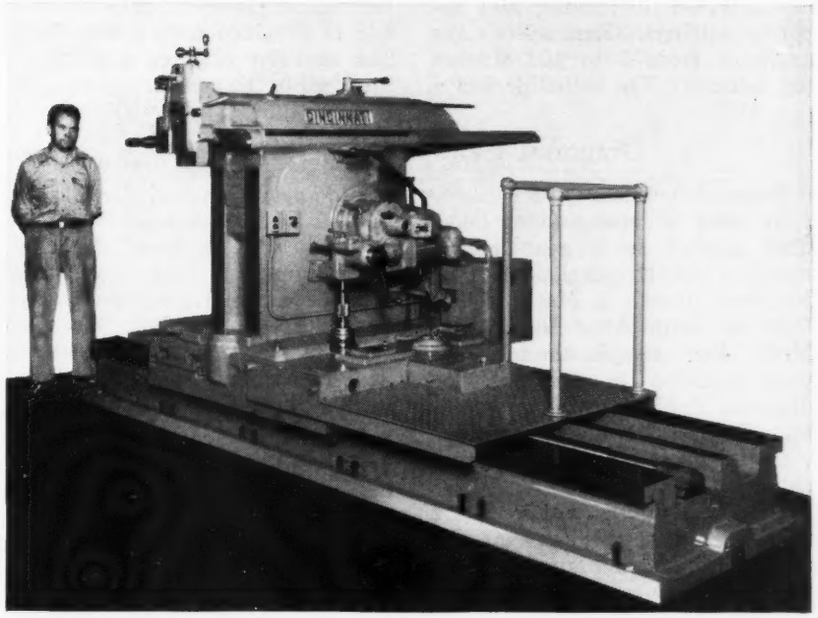


Cincinnati Gilbert rotary table horizontal boring, drilling, and milling machine



Traveling shaper developed recently by the Cincinnati Shaper Co.

Cincinnati Traveling Shaper

New design features have been embodied in a traveling shaper recently brought out by the Cincinnati Shaper Co., Hopple, Garrard, and Elam, Cincinnati 25, Ohio. Although developed primarily to meet the requirements of a Swiss motor-generator manufacturer, the new shaper is suitable for other work that requires shaping operations to be performed over large travel areas.

The machine illustrated was built to machine mating steps in the ends of cast-steel generator half-rings, 20 feet in diameter, weighing 7 tons. Approximately 8 feet of the ends of two semicircular rings are shaped on a single set-up.

The new machine can also be used for shaping cross-slots in press beds or long die shoes or for machining long, interrupted surfaces that do not lend themselves readily to planing. Thus it has many applications in large metalworking plants.

The shaper is built with a ram stroke of 36 inches. It has either hand or power feed and built-in power rapid traverse. There are two complete automatic oiling systems, one for the ram, feed, and drive mechanism, and the other for the saddle and ways.

A full-length scale in the center guide bearing and vernier, vernier light, and magnifying glass

To obtain additional information on equipment described on this page, see lower part of page 224.

are provided for making very accurate settings. Ram speeds are available from 8 to 102 strokes per minute. The tool-slide has a vertical adjustment of 9 inches, and is provided with power feed. The operator rides on a platform attached to the saddle. 79

Diagonal Gear-Lapping Machine

Some of the techniques successfully used in gear-shaving have been applied in a gear-lapping machine recently developed by the National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. For example, the new lapping machine is designed for diagonal feeding, which eliminates the necessity for feeding the work into the lap during the machining cycle.

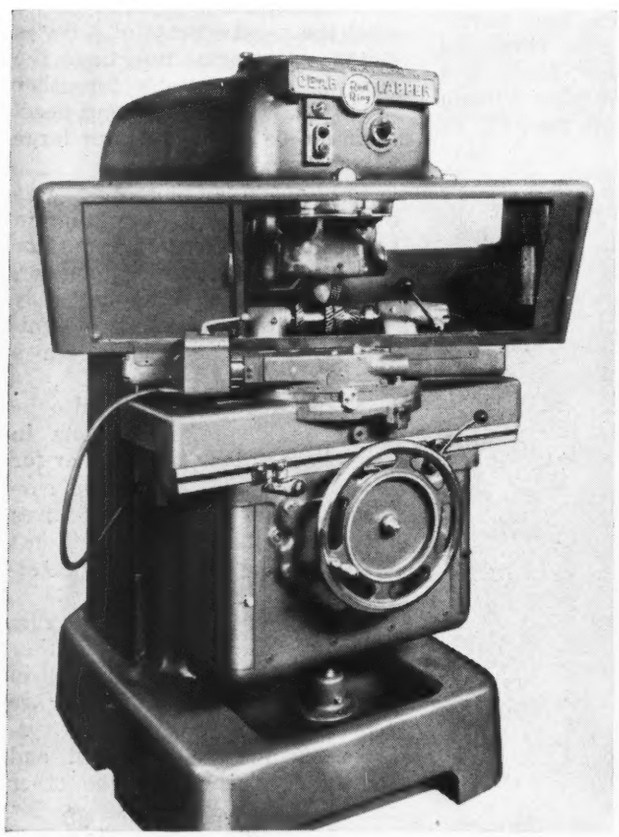
Diagonal lapping, which usually requires only two passes of the work through the lap—one forward and one back—is much faster than conventional lapping, and also makes it feasible to correct gear errors of greater magnitude. It will correct most of the eccentricity error, and with it over-size gears can be brought to size without depending on the machine operator to control the in-feed for size. The diagonal method permits a crown to be produced on straight teeth during the lapping operation, and allows taper teeth to be corrected.

The new "Red Ring" diagonal lapping machine permits gears to be lapped conventionally or diagonally with equal facility. Conventional lapping can be employed for wide-faced gears merely by locking the work-table in line with its direction of reciprocating travel. The principle of crossed-axes lapping has been retained in the design of the new machine. Consequently, the lap head can be precisely positioned for any selected angle between the work-gear and lap axes. Lap speeds and table feeds are mechanically controlled, and can be varied to meet requirements. The new hardened lap is especially heat-treated to increase its service life.

The sub work-table is hinged to compensate for non-uniformity in gear sizes, and is designed to facilitate loading, reduce operator fatigue, maintain any predetermined pressure between lap and work, and compensate for lap wear. The sub work-table is air-operated and spring-loaded. The work-gear is placed in free mesh, while the lap and the tailstock are clamped. At the end of the lapping cycle the air cylinder unlocks the table and lowers it, so that the work can be readily removed. 80

"Twin-Wheel" Carbide-Tool Grinder

The Standard Electrical Tool Co., 2500 River Road, Cincinnati 4, Ohio, has announced a new "Twin-Wheel" wet or dry grinder for carbide, Stellite, and high-speed steel tools. With this grinder, a roughing wheel can be mounted at one end, and a finishing wheel at the other. The machine can be used conveniently by one or two operators. The table tops have renewable steel wear plates, and the tables can be tilted from 15 degrees above to 30 degrees below the horizontal position. Hinged structural steel wheel guards make it easy to mount a new wheel. Each guard incorporates a single



Diagonal gear-lapping machine brought out by the National Broach & Machine Co.

"Twin-Wheel" carbide-tool grinder made by the Standard Electrical Tool Co.

To obtain additional information on equipment described on this page, see lower part of page 224.

three-way coolant control valve and two spouts for each wheel.

The equipment includes a reversing control switch; protractor tool guide with diamond-holder; tray for tools and honing stone; and built-in exhaust outlets for dry grinding. This grinder is made in two types, one having a 1 1/2-H.P. motor and two 10-inch plate-mounted cup-wheels, and the other a 3-H.P. motor and two 14-inch cup-wheels. 81

Thompson "Truforming" Contour Grinding Machine

A new "Truforming" contour grinder has been developed by the Thompson Grinder Co., Springfield, Ohio, which reduces the grinding time on 8-inch circular wood saws from ten to two and one-half minutes. Formerly this job was performed on a circular single-chuck grinder which required two operations and eight to ten minutes to complete a single 8-inch saw.

As shown in Fig. 2, the grinding wheel of the machine covers the entire saw area to be shallow-tapered. Both the grinding wheel and saw rotate during the operation. It will be noted that the saw is ground to a thickness of 0.086 inch at the outer edge, to 0.058 inch in a one-inch taper, and to 0.069 inch at a distance of 1 5/8 inches from the center. These grinders for circular wood saws are now available in 6- to 12-inch and 6- to 16-inch sizes. Crushing, truing, and working cycles of operation are automatic with push-button control. The machines have centralized control. 82

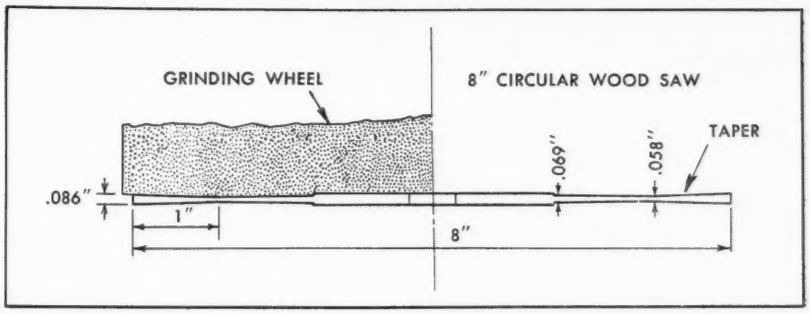


Fig. 2. Diagram showing relative positions of wheel and work handled on "Truforming" machine shown in Fig. 1

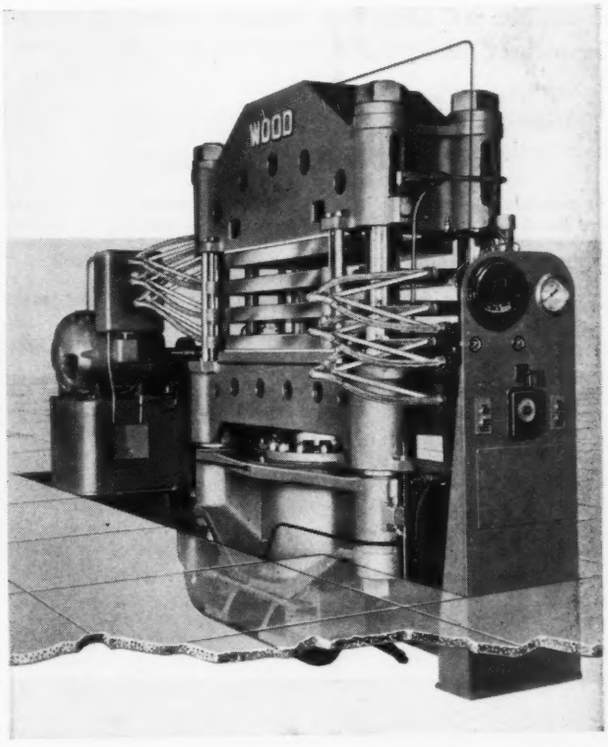
Combination Embossing and Polishing Press

The R. D. Wood Co., Public Ledger Building, Independence Square, Philadelphia 5, Pa., has recently announced the development of a 500-ton capacity, three-opening four-platen press, capable of semi-automatic or manual operation, for polishing and embossing work.

Polishing is accomplished by steam platens, 26 by 54 inches in size, spaced 3 inches apart. For embossing, the three upper steam platens are secured in the top position and the lower moving platen is fitted with blocks to provide a single 4 3/4-inch opening. The embossing die is attached to the third platen from the top and the bottom platen is used as the embossing anvil. The size of the working surface of the moving platen is 56 by 28 inches.

The press is self-contained, and is furnished with a radial piston type pump unit. It is available in various sizes and capacities to meet requirements. 83

Fig. 1. "Truforming" contour grinding machine developed by Thompson Grinder Co.



Combination embossing and polishing press announced by the R. D. Wood Co.

To obtain additional information on equipment described on this page, see lower part of page 224.

A "Multi-Dividend" Investment
for production milling of small parts

THIS modern, manufacturing-type milling machine is a glutton for work. It is highly efficient and adaptable to all types of small milling operations. It produces work of consistently-uniform accuracy and finish and operates at an extremely rapid, economical rate. In nearly every plant there are plenty of jobs to keep the Brown & Sharpe No. 000 busy . . . continuously . . . assuring multi-dividends from the investment, over a long period of time.

Get the advantages of low-cost, high quality milling on small pieces such as parts for sewing machines, radios, industrial instruments, business machines and similar products. Collect "multi-dividends" on your investment in milling equipment. Send for the No. 000 illustrated Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

THE VERSATILE No. 000 PLAIN MILLING MACHINE

No. 000 DIVIDEND FEATURES

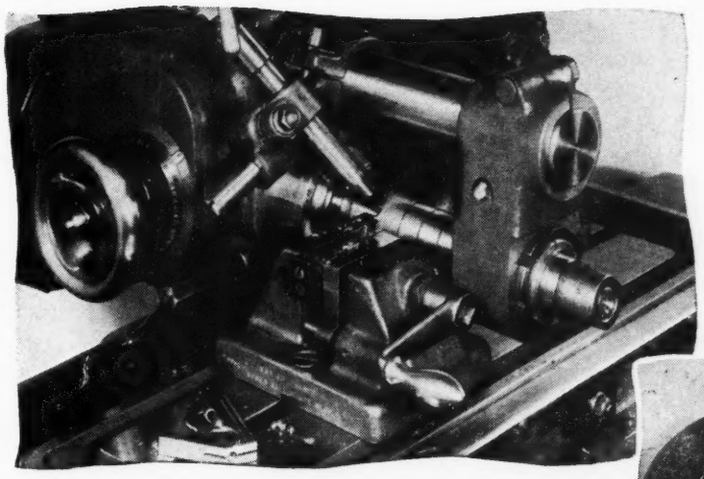
for consistent accuracy and finish

- 16 changes of spindle speed, 105 to 3540 R.P.M., suitable for milling a wide range of materials—extra high speed range available.
- 16 rates of feed from 9/16" to 24 3/8" per minute—with full automatic operation.
- Direction of spindle rotation can be set by switch. With intermittent operation, spindle stops when table stops . . . to assure safety in loading.
- Table reversal accurate to .002" . . . particularly advantageous in making blind cuts.

for fast production rate

- Extremely rapid fast-travel movement.
- Work can be safely advanced at fast travel close to cutter.
- Wide range of feeds permits fast efficient milling on a variety of materials.
- Automatic cycle reduces operator fatigue and non-cutting time to minimum—often permits operator to load work with both hands.
- Simple, fast set-ups.

BROWN &

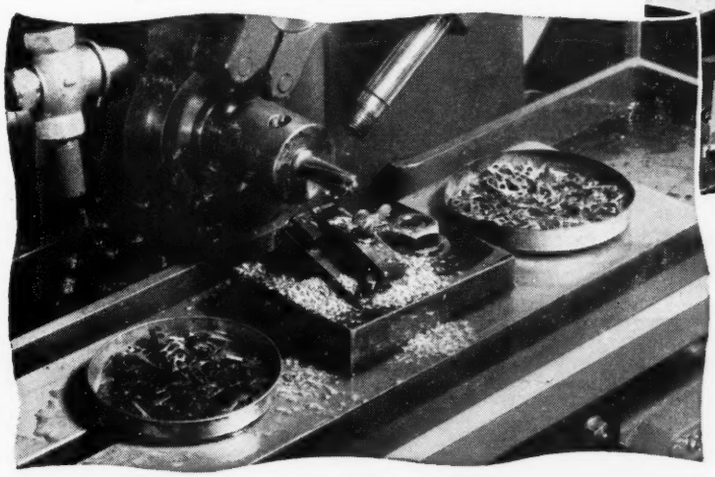


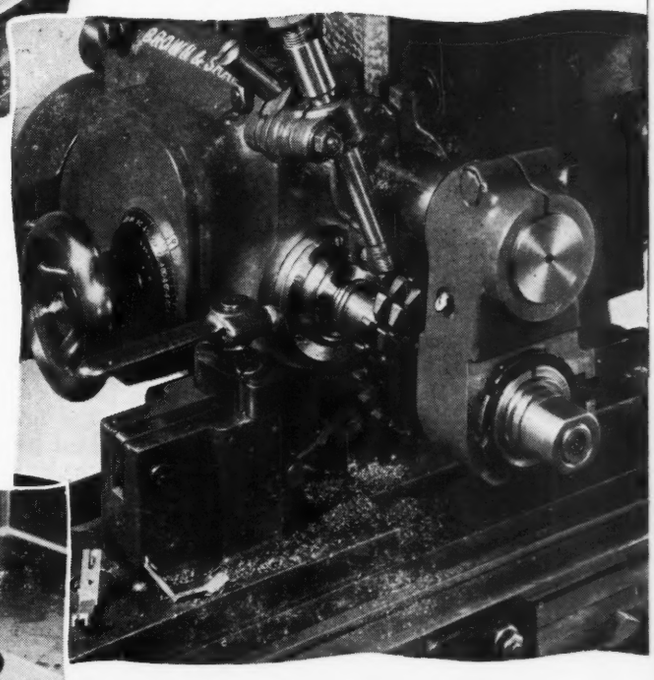
A Dividend of Accuracy ▲

Consistent accuracy of table reversal . . . to .002" . . . assures uniform depth of slot in this blind cut.

A Dividend of Speed ▼

Rapidity of table movement permits taking light, short cuts practically as fast as operator can load and unload fixture.



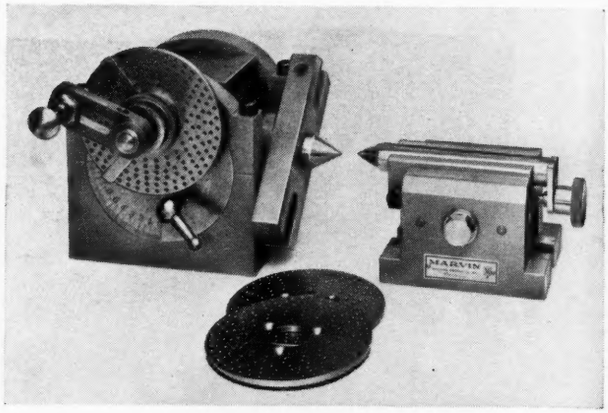


A Dividend of Versatility ▲

Broad range of spindle speeds permits efficient use of comparatively large cutters down to the smallest end mills.

SHARPE B·S

Ingersoll-Rand air compressor driven by Diesel engine



Dividing head brought out by Marvin Machine Products

Diesel-Engine Driven Air Compressor

A new "Mobil-Air" portable air compressor with a capacity for delivering 500 cubic feet of air per minute at a pressure of 100 pounds per square inch has been announced by the Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. This IKA-500 compressor is equipped with an International Harvester heavy-duty Diesel engine, which starts easily as a low-compression gasoline engine and, after a short warm-up period, is shifted to full Diesel operation.

A new floating-speed regulator slows down the compressor to the lowest practical working speed that compresses just enough air to hold the required pressure, thus saving fuel and maintaining a high average air pressure. Other features include a two-stage air-cooled compressor; "Hydro-Shift Flex-Disc" clutch; channel valves; and a new air cleaner. 84

Marvin Dividing Head

Marvin Machine Products, Inc., 414 Ford Bldg., Detroit 26, Mich., has brought out a dividing head that provides for a wide range in the number of divisions available to meet specific requirements. This new head has the conventional 40-to-1 gear ratio, and is mounted on two heavy trunnions. It is especially adapted for dividing operations required in lay-out work, gear-cutting, machining splines, fluting taps or reamers, developing cams, and machining hexagonal screws.

The unit is supplied with three index-plates, each plate having six sets of holes. It can be tilted from 5 degrees below the horizontal axis to 30 degrees past the vertical axis, or a total of 125 degrees. The tailstock has two pins that align it in a horizontal position with the headstock, and it is vertically adjustable for tapered work. The tailstock center has a travel of 1 inch. The spindle nose has a No. 2 Morse taper socket and a 1-inch diameter thread of 10 pitch.....85

Fifth-Position Attachment for Warner & Swasey Automatics

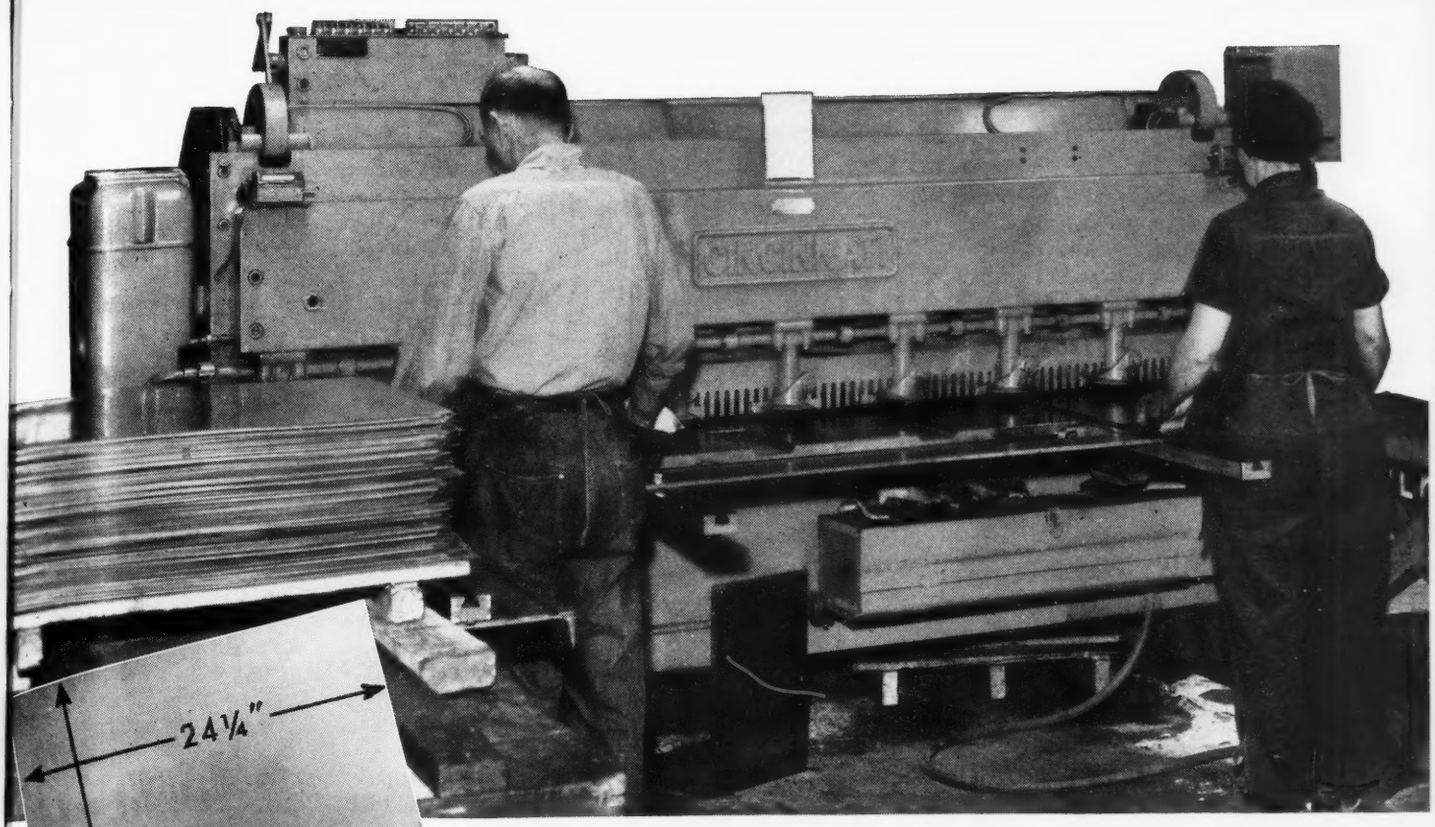
The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio, has brought out an independent attachment for its five-spindle automatics that is designed to permit a variety of operations at the fifth longitudinal station, which is normally inactive during cut-off. This attachment provides for drilling, reaming, facing, chamfering, counterboring, burring, and threading in the cut-off position. It consists of a cam-operated actuating lever, which drives a stroke arm linked to a tool-holder that is mounted on a slide affixed to the main tool-slide.

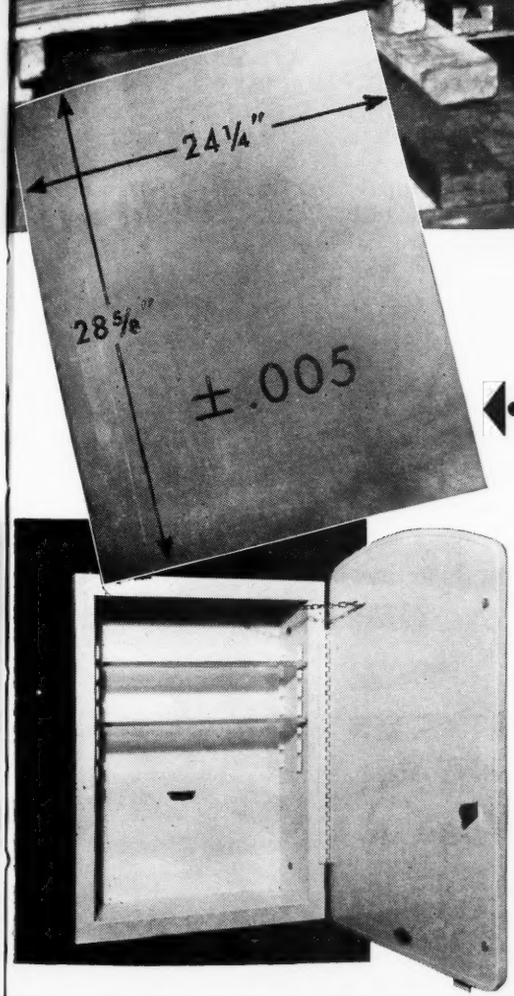
This simple arrangement permits a variable-stroke tool with accelerated tool retraction to operate during cut-off, retracting before the finished piece actually drops. The extra cutting operation is performed with no sacrifice in the simplicity of set-up of the quadrant-controlled design of the five-spindle machine.

The device is provided with easily set pivot-point adjustments for an infinitely adjustable feed stroke in a 3/16- to 3 3/4-inch

Fifth-position attachment developed for Warner & Swasey five-spindle automatics

To obtain additional information on equipment described on this page, see lower part of page 224.





ALL ALONG THE LINE

←····· this accurate blank

SAVES MONEY!

At 400 an hour, accurate steel blanks, 24¼" x 28⅝", are produced in lots of 10,000 from 26 gauge stock sheets.

Costs are low because of the accurate performance, rapid gauging, ease of control and safety features of Cincinnati All-Steel Shears. One and one-half to two million cuts are made before knives need regrinding—an important factor in the low cost.

The shear is so accurate that all along the production line rejects are very low. Gauging for forming and bending operations is simple and rapid, assembly is smooth, time and money are saved, and a high quality of product is maintained.

Write for your Shear Catalog S-5. Consult our Engineering Department on your shearing problems.

Photos Courtesy The F. H. Lawson Company

These accurate blanks are held to tolerances of ± .005" on Cincinnati Shears in the shops of The F. H. Lawson Company, manufacturers of medicine cabinets, pails and all sorts of containers.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

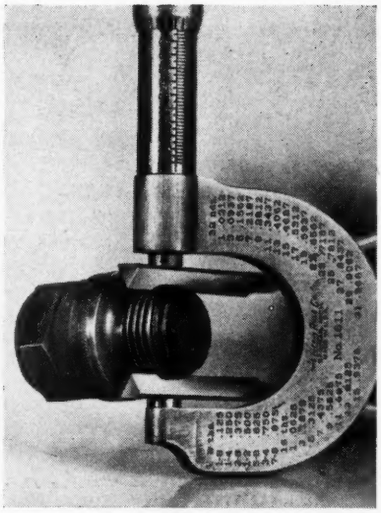
SHAPERS · SHEARS · BRAKES

range within a total stroke of from 3 1/16 to 8 1/4 inches. At both the top-link and center-pivot points of the actuating lever, there is a choice of two pin locations, and various combinations of these may be chosen, while the stroke-arm slide link can be set anywhere along a 4-inch graduated scale at the bottom of the actuating lever for the exact length of stroke desired. 86

Niagara Power Shears for Light-Gage Metal

A line of high-speed power shears for cutting light-gage sheet metal has recently been introduced by the Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y. These shears can be operated continuously at 125 strokes per minute on mild steel up to 20 gage, producing cuts that are straight and clean. Full visibility of the cutting edge through the arched openings and over the top of the hold-down bar facilitates accurate shearing to lay-out lines.

Housings, bed, hold-down, and cross-head are fabricated from electrically welded steel plate to give greater strength and rigidity, combined with reduced weight. Bronze bearings and ways are employed to insure longer life. The aerial gap or "pancake" type motor is almost entirely concealed in the right-hand upright, making a compact, completely covered drive unit. 87



Measuring thread with precision-ground triangular bars of new system announced by W. T. Simmons

New System for Screw-Thread Measuring

A new system of screw-thread measuring has been announced by W. T. Simmons, Box 364, Amarillo, Tex. Used with standard micrometers, the only other tool needed to measure all sizes and pitches of 60-degree threads consists of one connected pair of hardened and precision-ground triangular steel bars with points truncated to clear the thread roots.

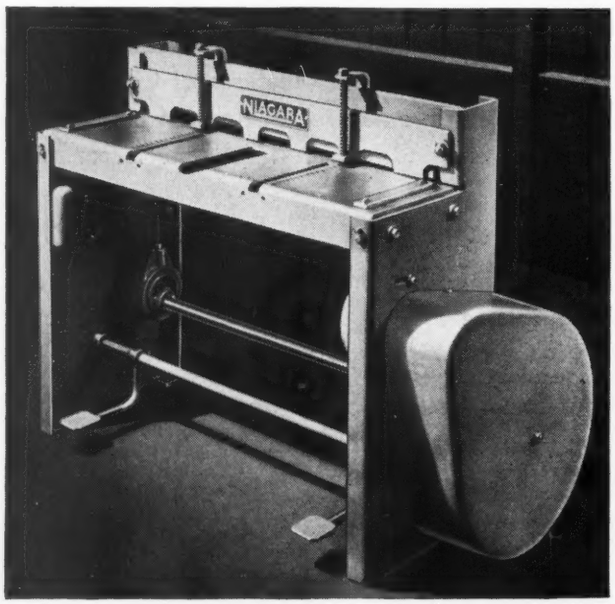
The most outstanding feature of the new system is the elimination of the necessity for using formulas or making lengthy calculations. By the use of a simple chart of constants, only one number need be added to the nominal outside diameter of the thread to determine the correct micrometer measurement for a thread of any given diameter and pitch. Although the nominal outside diameter is used in the chart for finding the constants, compilation of the constants was based on measurements at the pitch diameter. This system can be used for threads ranging from 4 to 56 pitch, inclusive.

As an example, suppose a 1 3/8-18 screw thread is to be cut in a lathe. The nominal outside diameter of 1.375 inches is simply added to the chart constant for all 18-pitch threads, which is 0.316 inch. The result, 1.691, is the proper reading across the thread and triangles for a Class 4 fit. By cutting 0.003 to 0.006 inch under size, a Class 3 fit is obtained.

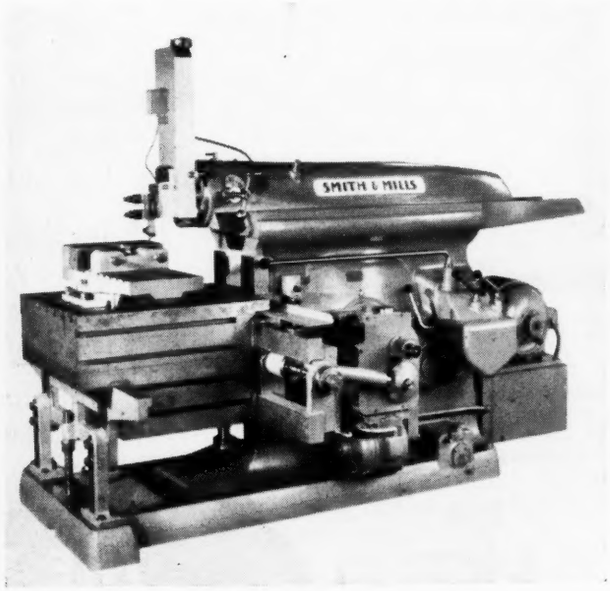
The thread triangle measuring system has the advantage of showing up errors in the 60-degree angle of the thread form and in the root clearance. 88

Smith & Mills Heavy-Duty Shapers

Smith & Mills Shapers, Inc., Division of Hamilton-Thomas Corporation, Hamilton, Ohio, have added a new model to their line of heavy-duty shapers. This shaper, made in 32- and 36-inch sizes, has been designed especially for use in railroad and production shops where shaping operations must be performed on large castings.



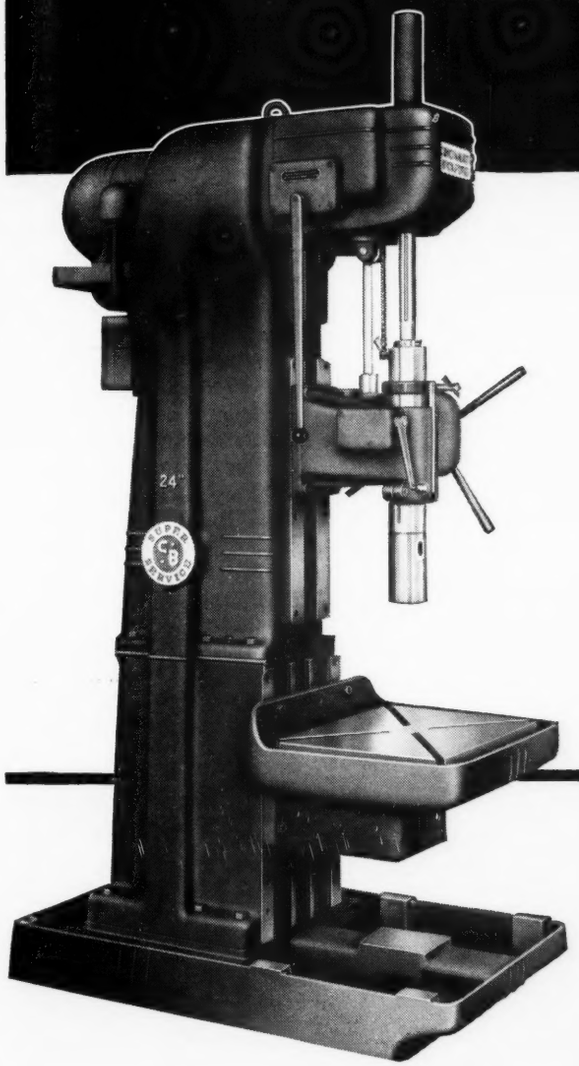
Power shears for light-gage metal made by the Niagara Machine & Tool Works



Heavy-duty shaper placed on the market by Smith & Mills Shapers, Inc.

To obtain additional information on equipment described on this page, see lower part of page 224.

They have the SPEED and ENDURANCE for *Automotive Production*

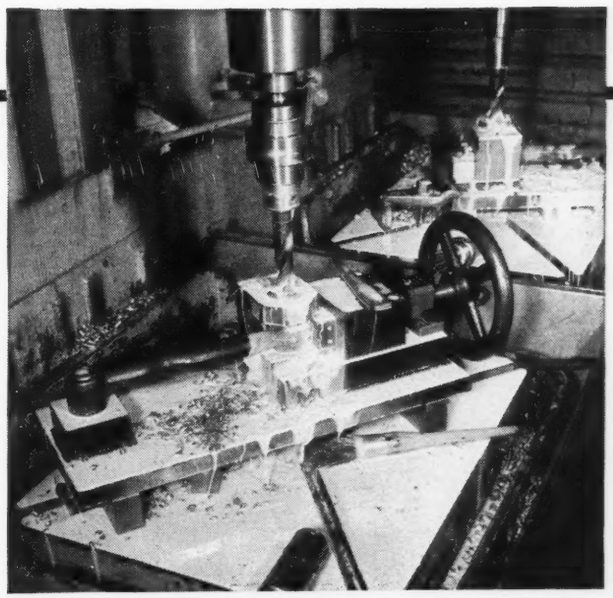


Among the factors which permit long and severe working performance of Bickford Super Service High Production Upright Drills are the direct drive motors, positive type clutch, sturdy gearing, integral keying of all spline shafts, and complete protective enclosure of all mechanism.

Speeds and feeds are easily obtained by the operator. Control levers are at operator's finger tips, and bring rapid and easy operational control.

The close-up shows a Cincinnati Bickford Super Service Upright Drill at work in the automotive industry where production is a must.

Write for Booklet U-27—a complete description of the construction features and capacities of Cincinnati Bickford Super Service Single and Multiple Upright Drills.



Courtesy—The Kaiser-Frazer Willow Run Plant.

Our 75TH Year
CINCINNATI BICKFORD
1874-1949
METAL DRILLING MACHINERY
SUPER SERVICE

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. **cincinnati 9. Ohio U.S.A**

Greater capacity under the ram is obtained by means of a drop table that permits increasing the cross table travel. The table has also been widened. For standard work, a table filler block is provided for mounting on the drop table.

Time-saving features include horizontal and vertical power rapid traverse to the table, automatic tool-lifter, and automatic vertical feed to the tool. The 32-inch shaper illustrated was built for shaping the top and recessing both ends of a large semi-steel casting in one set-up. Maximum clearance under the ram is 26 1/2 inches, and maximum table travel is 40 inches. The table width is 30 inches. 89

Verson Small Power Press Brake

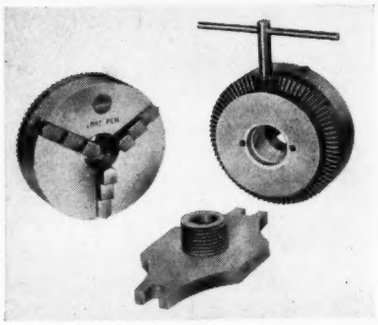
A low-priced power press brake has been developed by the Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill., to replace hand press brakes and to eliminate the need for tying up big machines on small odd jobs. The new brake, designated the Verson 16-48, has a bed and ram length of 48 inches. It is suitable for most types of metal forming ordinarily performed on press brakes. Rated air bending capacities range from a 48-inch length of 16-gage stock over a 1/2-inch opening to 24-inch 10-gage stock over a 1 1/8-inch opening.

This machine is of all steel construction, designed to assure accurate alignment and maximum rigidity. All gears are of steel, with machine-cut teeth. Eccentric and intermediate shafts are mounted in solid renewable bronze bushings. A totally enclosed friction clutch and self-releasing band brake are employed. Alemite hand fittings are provided for convenient lubrication. A variable-speed arrangement provides an operating range of twenty to fifty strokes per minute. Where portability is required, the machine can be mounted on casters. 90

Westcott Three-Jaw Chuck

The speed of a lever-operated chuck is combined with the powerful grip of a pinion-operated chuck in a new three-jaw universal chuck brought out by the Westcott Chuck Co., Oneida, N. Y. This chuck has solid reversible jaws, and is threaded for direct attachment to lathe spindles with 1 1/2-8 threads. The same chuck can also be used on a milling machine dividing head. The chuck body is 5 inches in diameter by 2 inches thick.

A new threaded mounting plate, to which the chuck can easily be attached, facilitates quick bolting to the table of a drill press or milling machine to permit using the chuck as a vise or a machining fixture. The chuck can also be transformed into a vise for holding cylindrical pieces by simply bolting the mounting plate to a work-bench. 91



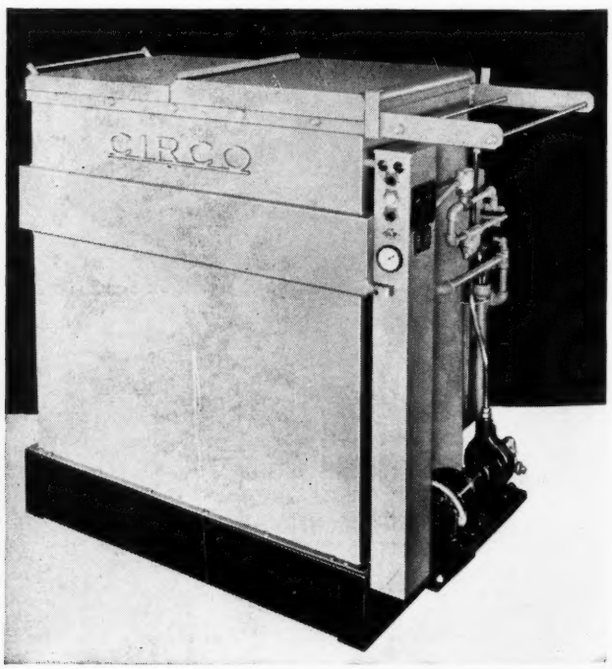
Westcott universal three-jaw chuck with quick acting scroll wrench and threaded mounting plate

Circo Hot Vapor Degreasers

Small metal parts can be automatically degreased and dried in from three to five minutes by a new hot vapor degreaser brought out by Circo Products Co., 12117 Berea Road, Cleveland 11, Ohio. Large assemblies, such as engine blocks, can be handled in about fifteen minutes. The hot-vapor degreasing solvent is non-caustic, harmless to all types of metal, and will not burn or explode.

Parts to be cleaned come into contact only with the solvent vapor, which is always clean. The

Small power press brake built by Verson Allsteel Press Co.



Hot vapor degreaser built by Circo Products Co.

To obtain additional information on equipment described on this page, see lower part of page 224.

vapor reaches the most inaccessible parts, even penetrating cracks. After the part is removed from the vapor, the solvent that oozes out of the cracks is visible, while the rest of the degreased part remains perfectly dry.

The degreasers are made in two models, the tank of the smaller machine measuring 25 inches wide by 45 inches long by 30 inches deep, while that of the larger machine is 31 inches wide, 71 inches long, and 30 inches deep. 92

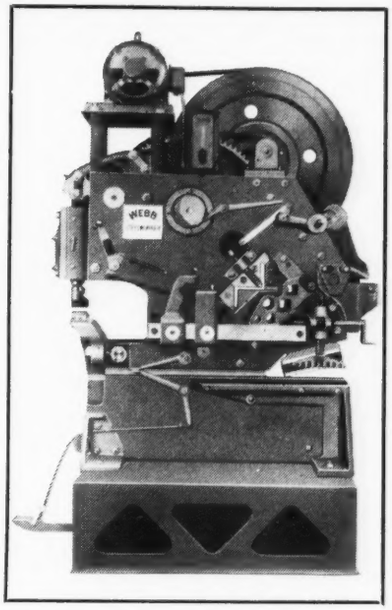
Automatic Bar-Feeding Device for Band Saws

Horizontal metal-cutting band saws can be converted into fully automatic cut-off machines by the use of an automatic bar-stock feeding attachment made by the Wells Mfg. Corporation, 404 S. Grant, Three Rivers, Mich. This easily attached device is known as the "Wells-O-Bar Feed Master."

Feeding of material in various sizes and shapes is accomplished by an air-actuated spiral roller drive, operated at an air pressure of 60 to 80 pounds per square inch. Positive air control of the saw frame during each cutting and resetting cycle makes the cutting action completely automatic.

The maximum length of multiple cuts is 18 inches. Cuts can be made to within 5 inches of the end of the stock. A trip is provided to operate a safety device which will shut off the feeder when the last piece is cut off.

The roller table track that supports the stock can be adjusted to a height of 24 to 30 inches. This table track requires a floor space only 20 by 72 inches. The weight of the complete unit is approximately 285 pounds. 93



Combination punch, shear, and coper developed by the Webb Corporation

"Steelworker" Combination Punch, Shear, and Coper

The Webb Corporation, Webb City, Mo., has developed a combination punch, shear, and coper, designated the "Steelworker," for use in structural shops, maintenance shops, and other plants regularly handling punch and shear work. The machine is of unit construction, with steel plates accurately fitted together and machined throughout.

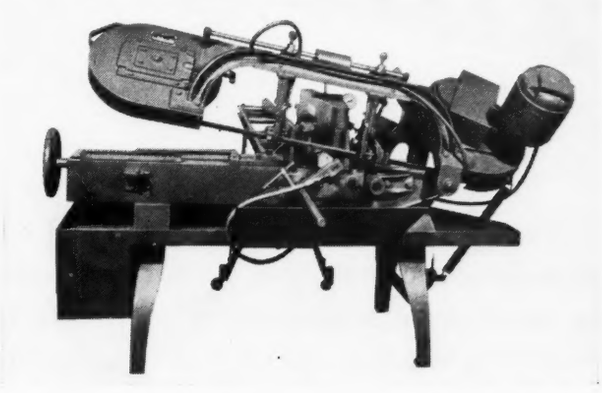
There is a punch at one end of the machine and a section cutter at the other end for cutting angles and T- and Z-shaped bars with either straight or miter cuts. Straight cutting of round and square bars, as well as shearing of 1 1/2-inch plate, can also be accomplished on this machine. In addition, either a coping or notching attachment can be provided for the coping of I-beams and channels or the notching of angles. The machine is compact, and is driven by a 3-H.P. motor. It weighs about 3400 pounds.....94

"Gearmaster" Precision Gear Measuring Micrometer

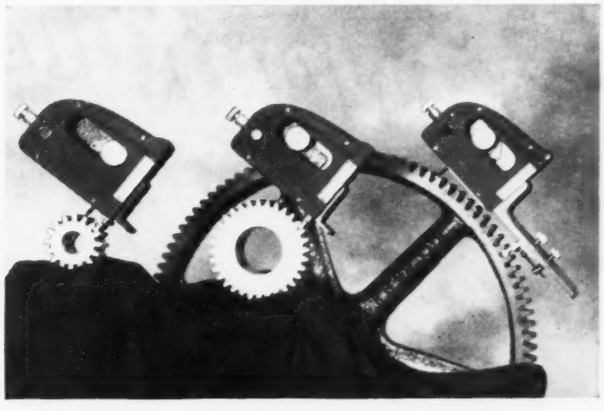
A new "Gearmaster" micrometer reading to 0.0001 inch and special spur gear charts designed to permit all measurements and characteristics of a gear to be determined in one set-up and in a single operation have been announced by the Urbauer Engineering Co., Naperville, Ill.

The body of this instrument and extension bars for large gears are made from "Invar" nickel alloy steel, which will not expand at any operating temperature to which the instrument may be subjected. This feature permits machine and engine builders to check their gears continuously until they are assembled in the machine, even while they are hot, and to compare these measurements with those taken with the gears cold.

The "Gearmaster" system of measurement is applicable to spur, helical, herringbone, and internal gears, and to silent and roller chain sprockets. Complete, easy to understand instructions are part of the system, so that any mechanic can determine chordal measurements, tooth thickness, tooth spacing, tooth form, tooth pressure angle, backlash allowance, diametral pitch, pitch diameter, and possible mandrel run-out in but a fraction of the time formerly necessary. 95



Band saw equipped with automatic bar-feeding device made by the Wells Mfg. Corporation

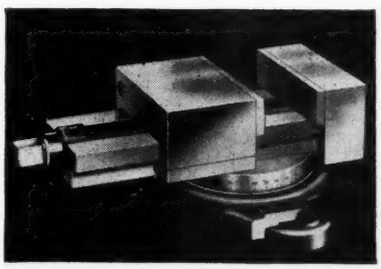


"Gearmaster" micrometers shown being used for measuring three different sizes of gears

To obtain additional information on equipment described on this page, see lower part of page 224.

Northwestern Punch Press Set of Studs, Couplings, and Flanged Nuts

New punch press set brought out by Northwestern Tool & Engineering Co., 117 Hollier Ave., Dayton 3, Ohio. Can be furnished in stud sizes of 1/2-13, 5/8-11, 3/4-10, 7/8-9, or 1-8. Each set consists of four studs of each of the following lengths: 3, 4, 5, 6, 7, and 8 inches; four coupling nuts; and four flanged nuts. 96

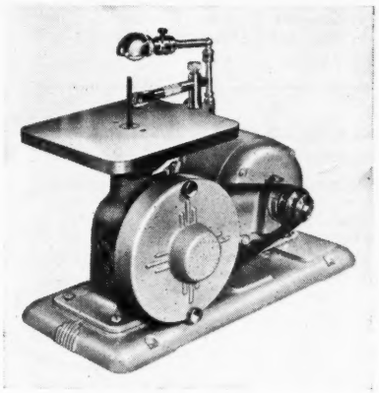


South Bend Small-Size Machine Vise

Small-size swivel vise of new design brought out by South Bend Lathe Works, 383 E. Madison St., South Bend 22, Ind., for holding work on shapers, milling machines, drill presses, and other machine tools. 97

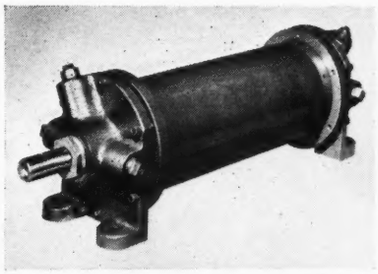
Benchmaster Die Filer

Die filer introduced by Benchmaster Mfg. Co., 2952 W. Pico Blvd., Los Angeles 6, Calif. Uses either 1/8- or 1/4-inch shank files, and has provision for varying the stroke length from 3/16 to 3/4 inch. The 8 1/2-inch square table tilts front and back, permitting accurate filing of clearance on dies and similar work. Operates with either a 1/6- or 1/4-H.P. motor. 98



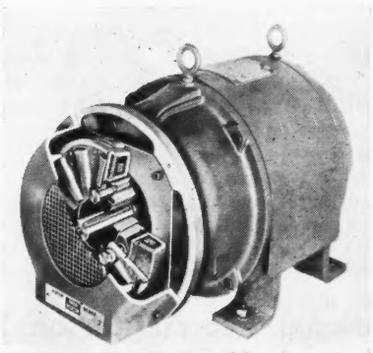
Tomkins-Johnson Air Cylinder

Air cylinder designed without tie-rods, announced by the Tomkins-Johnson Co., Jackson, Mich. It is made in sizes designed for the same range of air pressures as the manufacturer's tie-rod type line, which covers a range of 80 to 100 pounds per square inch. 99



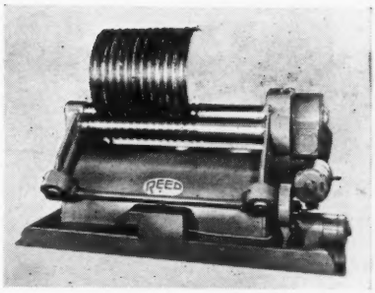
Disk Type Electric Brake for Motors

Motor equipped with disk type electric brake developed by the Warner Electric Brake Co., Beloit, Wis., to give easily controlled, quick, and smooth-cushioned stops. Available in standard sizes for mounting on NEMA standard motor frame sizes 203 through 365. Larger and smaller brakes are also available for special motor mountings. 100



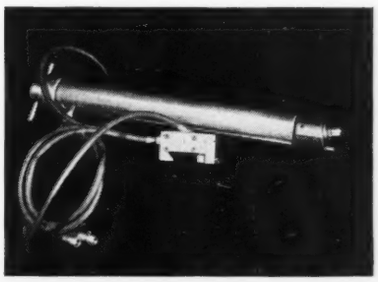
Reed Corrugated-Sheet Rolling Machine

Corrugated-roll machine developed by the Reed Engineering Co., 1003-17 W. Fairview Ave., Carthage, Mo. Equipped with three corrugated shafts that fit any standard sheet-metal corrugation. Designed for rolling previously corrugated sheets into circular and semicircular forms. Approximate dimensions are 40 inches wide by 102 inches long, and weight is 4650 pounds. 101



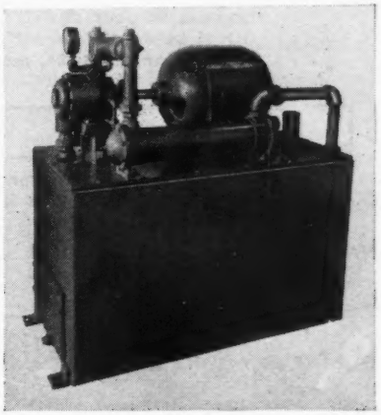
Citco Hydraulic Diamond Turner for Dressing Tools

Citco hydraulic diamond turner, which automatically repositions the diamond used in truing or dressing wheels after each pass of diamond across wheel. Built to turn diamond 3 degrees—just enough to present a sharp cutting edge on the diamond without changing the amount dressed off the wheel. Designed for use on Cincinnati centerless grinders and manufactured by the Cleveland Industrial Tool Corporation, 1080 E. 222nd St., Cleveland 17, Ohio. 102

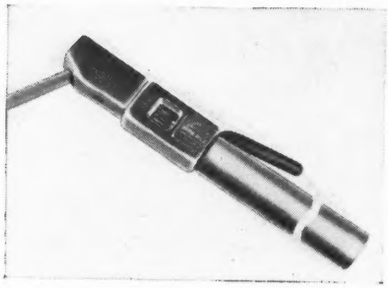


Rucker Fluid Power Unit

Hydraulic power unit brought out by the Rucker Co., 4228 Hollis St., Oakland, Calif. This is one of forty models developed to meet the needs of any industrial fluid power application in a range of 2 to 75 H.P. Special models can be built up to 300 H.P. 103



To obtain additional information on equipment described on this page, see lower part of page 224.

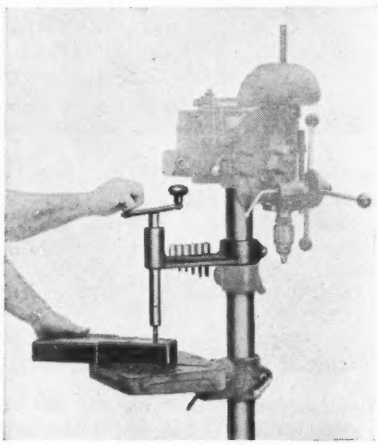


Heavy-Duty Electrode-Holder

New electrode-holder designed to remain cool under continuous-duty cycle operation at 725 amperes on 3/8-inch electrodes. Electrodes are held in a 60- or 90-degree position. This new holder is 15 inches long and weighs 32 ounces. Manufactured by Martin Wells, Inc., 5886 Compton Ave., Los Angeles 1, Calif. 104

Paragon Hand Tapping Machine

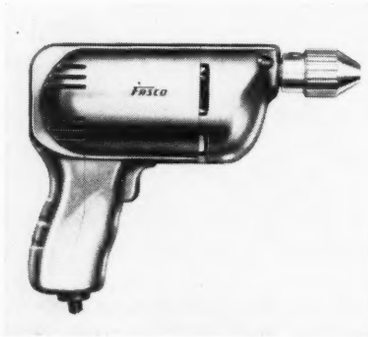
Hand tapping machine designed to eliminate tap breakage and speed up tapping in the tool-room and die shop.



Announced by Paragon Metal Products, 416 S. Broadway, Los Angeles 13, Calif. The tapper is equipped with quick-change tap adapters in seven sizes ranging from 8-32 up to 1/2 inch. 105

Fasco Electric Drill

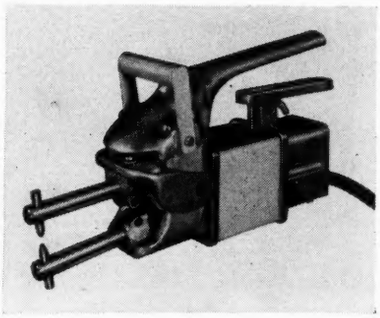
Portable electric drill that facilitates fast, easy application. Rated capacity is up to 1/4 inch in steel and 1/2 inch in wood. Trigger type switch permits instant control and can be locked for continuous drilling. Universal motor



operates on 110-120 volts alternating or direct current. The no-load speed is 1600 R.P.M. Over-all length, including chuck, 7 3/4 inches; diameter, 2 3/4 inches; and weight, 3 1/2 pounds. Manufactured by Fasco Industries, Inc., Rochester, N. Y. 106

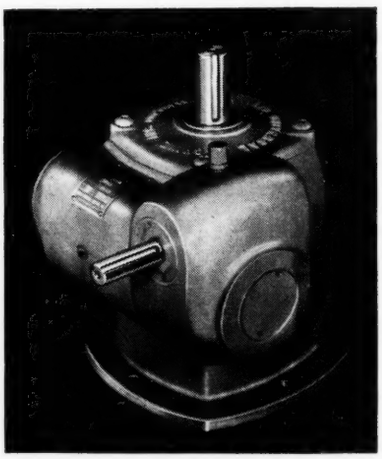
"Sureweld" Portable Spot-Welder

Portable spot-welder for welding stainless and mild steel up to 1/8 inch combined thickness. Designed for use in shops and factories handling sheet-metal work or wherever intermittent-duty spot-welding is employed. Weighs only 23 1/4 pounds, operates on 220-volt, single-phase, 50- to 60-cycle alternating current. Announced by the National Cylinder Gas Co., 840 N. Michigan Ave., Chicago 11, Ill. 107



Euclid Speed Reducer

Vertical type double-reduction speed reducer (Model No. VW-2) adapted for operating turntables and other vertical applications. The input capacity is 1/2 H.P. with an output torque of 1000 pounds-inch. Capacity varies, however, with the ratio, which has a range of from 10 to 1 to 3840 to 1, though oversize shafts are available upon order. Manufactured by Euclid Universal Machine, Inc., 15002 Woodworth Road, Cleveland 10, Ohio. 108



To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described in this section is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning machine as described in December, 1949, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

Fill in your name and address on blank below. Detach and mail within three months of the date of this issue to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

NAME.....**POSITION OR TITLE**.....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

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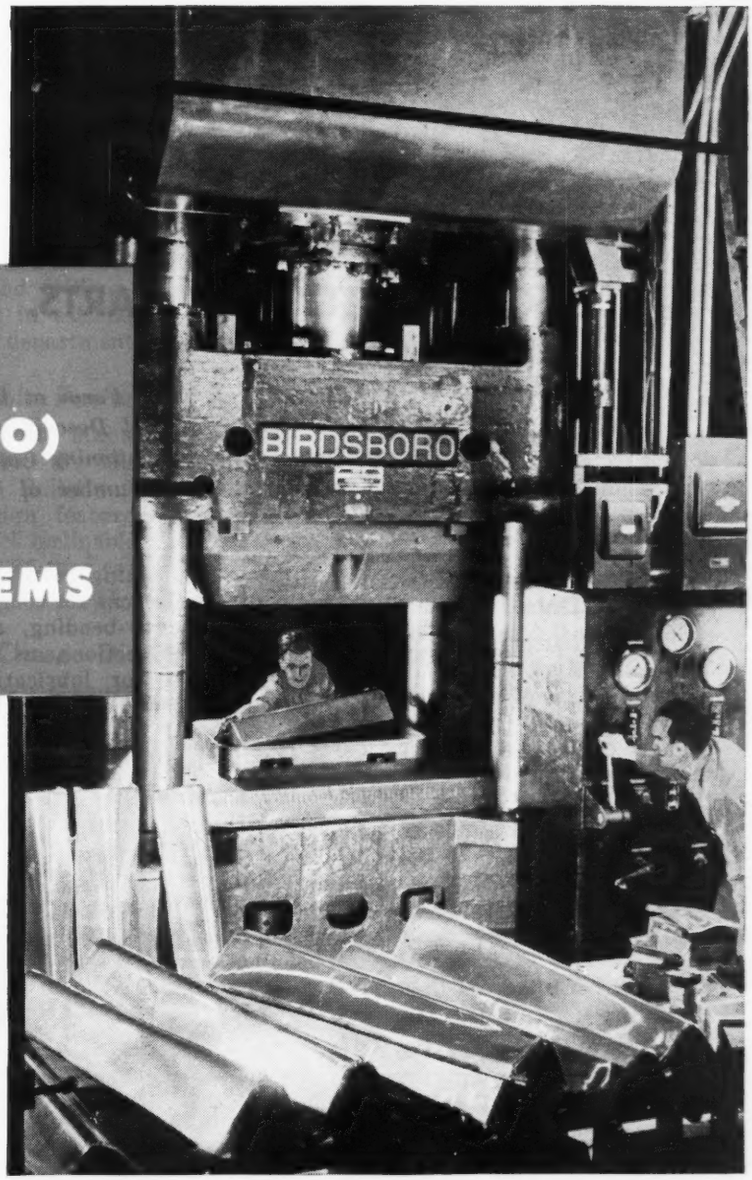
TEXACO
REGAL OILS (R&O) KEEP HYDRAULIC SYSTEMS

–RUST-FREE

–SLUDGE-FREE

–FOAM-FREE



You get much longer pump life . . . much greater efficiency and freedom from costly stoppages . . . when you charge hydraulic systems with *Texaco Regal Oils (R & O)*. First of all, they're rust-inhibited. Moisture can't get at the metal. Valves, gears and other parts all last longer because of this protection.

In addition, the special oxidation inhibitor in *Texaco Regal Oils (R & O)* fights sludge formation even under severe conditions. This assures free action of pumps and valves . . . keeps small orifices from clogging. And *Texaco Regal Oils (R & O)* are specially processed to prevent the foaming that causes erratic operation.

You can get *Texaco Regal Oils (R & O)* in the right viscosities—without "cutting back"—for every type and size of hydraulic mechanism. *Texaco Regal Oils (R & O)* are recommended by leading builders of hydraulic equipment, many of whom ship their units already charged with these fine, turbine-grade oils.

The success of *Texaco Regal Oils (R & O)* in improving hydraulic performance and reducing costs has been proved in plants everywhere. Let a Texaco Lubrication Engineer help you get these same benefits. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

TEXACO

TEXACO Regal Oils (R&O)
FOR ALL HYDRAULIC UNITS

TEXACO STAR THEATRE presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

New Trade Literature

RECENT PUBLICATIONS ON MACHINE SHOP EQUIPMENT, UNIT PARTS, AND MATERIALS

To Obtain Copies, Fill in on Form at Bottom of Page 230 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the December, 1949, Number of MACHINERY

Circular Slide-Rule with Tap Drill Data

DAYTON ROGERS MFG. CO., 2824 Thirteenth Ave., South, Minneapolis 7, Minn., is distributing a circular slide-rule giving complete decimal equivalents for fractions varying by 1/64 inch, as well as the correct tap drill size for all common taps. The device will be sent without charge if requested on a company letter-head, addressed to the Dayton Rogers Mfg. Co.

Oxy-Acetylene Machine Gas Cutting Guide

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17, N. Y., is distributing an oxy-acetylene gas cutting slide chart that gives the oxygen and acetylene pressures, speed in inches per minute, gas consumption, and approximate width of kerf for cutting various thicknesses of steels with two of the most widely used styles of cutting tips. 1

Presses

E. W. BLISS CO., 1420 Hastings St., Toledo 7, Ohio. Bulletin 9-B, illustrating and describing in detail Bliss straight-side, single-crank, single-action presses. Complete specifications are included for the different sizes. Bulletin 17-B, descriptive of Bliss straight-side, double-crank presses, including specifications for the seventeen sizes in the line. 2

Operating Instructions for Bending Machines

PEDRICK TOOL & MACHINE CO., INC., 3645 N. Lawrence St., Philadelphia 40, Pa. Operating instruction book for Pedrick bending machines, containing complete operating instructions for compression bending, draw-bending, and the bending of sections, as well as suggestions for lubrication and electrical instructions. 3

Tooling for Multiple-Spindle Bar Automatics

NATIONAL ACME CO., 170 E. 131st St., Cleveland 8, Ohio. Bulletin TP-44, entitled "Tooling for Top Performance on 44 Acme-Gridley Bar Automatic Jobs," containing performance data on jobs performed on Acme-Gridley bar automatics and a description of the tooling employed. 4

Stock Stops for Screw Machines

BALAS-COLLET MFG. CO., Department M, 1557 E. 27th St., Cleveland 14, Ohio. Leaflet announcing a new type of stock stop with Carboloy face, designed primarily for use on Brown & Sharpe automatic screw machines, but applicable also to other machines of similar type. 5

Milled Screw-Machine Products

WILLIAM H. OTTEMILLER CO., York, Pa. Catalogue containing complete data on the various standard and special screws made by this company, including dimensions, price lists, and buying information. A thumb-index is provided for convenient reference. .. 6

Cutting Tools

PLEW TOOL & METAL HEAT TREAT, South Line St., Columbia City, Ind. Pamphlet descriptive of a new series of cutting tools known as "Lucky 13," containing approximately 13 per cent cobalt content and specially heat-treated to obtain a high degree of hardness and toughness. 7

Tube Fittings

PARKER APPLIANCE CO., 17325 Euclid Ave., Cleveland 12, Ohio. Catalogue 203, containing 60 pages of design data, specifications, and other information on Parker fittings for hydraulic and fluid-handling systems. Tubing and tube-fabricating equipment are also described. 8

Bending Equipment

WALLACE SUPPLIES MFG. CO., INC., 1300 Diversey Parkway, Chicago 14, Ill. Catalogue 49, entitled "So You Want to Bend," containing 40 pages of data on hand and hydraulically operated bending machines for pipes and tubing, as well as sections and structural shapes. 9

Submerged Melt Welding

THE LINDE AIR PRODUCTS CO., UNIT OF UNION CARBIDE & CARBON CORPORATION, 30 E. 42nd St., New York 17, N. Y. Booklet containing 36 pages of the latest information on Unionmelt apparatus and supplies for submerged melt welding. 10

Free-Machining Steel

JOSEPH T. RYERSON & SON, INC., P.O. Box 8000-A, Chicago 80, Ill. Bulletin containing detailed information on "Ledloy" screw steel, a free-machining steel, the manufacture of which was curtailed during the war but has recently been resumed. 11

Precision Air Gages

SHEFFIELD CORPORATION, Dayton 1, Ohio. Catalogue DTP-491, devoted to the new Sheffield dial type "Precisionaire" for dimensional checking with high speed, including descriptions of the various models and showing many typical applications. 12

Optical Comparator Charts

JONES & LAMSON MACHINE CO., Springfield, Vt. Catalogue 49-471-7500, containing reproductions of the various types of charts for use in connection with Jones & Lamson optical comparators, together with information concerning their application. 13

Carboloy Blanks and Tools

CARBOLOY COMPANY, INC., 11147 E. 8 Mile Road, Detroit 32, Mich. Supplement 10 to Carboloy Catalogue GT-200, listing the new lower prices and quantity discounts on standard Carboloy tools, blanks, and diamond products recently announced. 14

Machines and Tools for Sheet-Metal Work

NIAGARA MACHINE & TOOL WORKS, Buffalo 11, N. Y. Vest-pocket booklet 200-G, showing typical examples of the company's line of presses, shears, and other machines essential to sheet-metal shops. 15

Drill Jig Bushings

UNIVERSAL ENGINEERING SALES CO., Frankenmuth 2, Mich. Catalogue B-1018, containing specifications, tolerances, prices, and other data for the company's line of drill jig bushings, locating pins, lock-screws, clamps, etc. 16

Vertical Boring and Turning Machines

AMERICAN STEEL FOUNDRIES, KING MACHINE TOOL DIVISION, Cincinnati 29, Ohio. Catalogues K-1, K-2, and K-3 covering King vertical boring and turning machines in sizes ranging from 30 up to 144 inches. 17

Automatic Drilling and Tapping Units

GOVRO-NELSON CO., 1931 Antoinette, Detroit 8, Mich. Bulletin containing detailed information on the company's new automatic drilling and tapping units with centrifugal feeding device having full hydraulic control. 18

Power Chart and Drilling Time Indicator

CINCINNATI BICKFORD TOOL CO., Oakley, Cincinnati 9, Ohio, is distributing a direct reading power chart and drilling time indicator for use in estimating and engineering departments. 19

Inclinable Power Presses

CLEARING MACHINE CORPORATION, 6499 W. 65th St., Chicago 38, Ill. Bulletin 211, describing the design features of Clearing open-back inclinable power presses of 30 to 75 tons capacity, adapted for a wide variety of work. 20

Insert-Chaser Die-Heads

EASTERN MACHINE SCREW CORPORATION, 23-43 Barclay St., New Haven, Conn. Bulletin 16, describing the construction and advantages of the H & G Style TM insert-chaser die-head for cutting taper threads. 21

Die-Castings

DOEHLER - JARVIS CORPORATION, 386 Fourth Ave., New York 16, N. Y. Circular entitled "How Large is a Die-Casting?", describing the largest aluminum die-casting that the company has ever produced. 22

Pressed-Powder Parts

NEW JERSEY ZINC CO., 160 Front St., New York 7, N. Y., is distributing a monthly publication known as the "Metal Powder Press," which is devoted to case histories of cost savings resulting from the use of pressed-powder parts. 23

Strip and Spring Steels

PRECISION STEEL WAREHOUSE, INC., 4409-25 W. Kinzie St., Chicago 24, Ill. 98-page catalogue containing complete specifications on the various brands of steel made by this company. Engineering information is included. 24

Thread Milling Machines

JAMES COULTER MACHINE CO., Bridgeport, Conn. Catalogue describing in detail the construction of the company's new thread milling machine known as the "Threadmaster." 25

Rotary Gear-Finishers

MICHIGAN TOOL CO., 7171 E. McNichols Road, Detroit 12, Mich. Bulletin 873-49, illustrating and describing a line of automatic crossed-axis rotary gear-shavers designed for the high-production finishing of large gears. 26

Centerless Polishing Machines

PRODUCTION MACHINE CO., Greenfield, Mass. Leaflet entitled "The Production Story," describing briefly the company's line of centerless polishing and buffing machines and other products. 27

Power Screwdrivers

DETROIT POWER SCREWDRIVER CO., 2799 W. Fort St., Detroit 16, Mich. Leaflet entitled "It's Versatile—It's Fast," describing various types of power screwdrivers, nut-drivers, and motorized hopper units made by the company. 28

Fastening Devices

SOUTH CHESTER CORPORATION, Finance Bldg., Philadelphia 2, Pa. 28-page manual containing engineering and application data on this company's line of blind rivets, anchor nuts, panel fasteners, door-retaining springs, etc. 29

High-Speed Steel

UNIVERSAL-CYCLOPS STEEL CORPORATION, Department M, Bridgeville, Pa. Bulletin announcing a new general-purpose high-speed steel known as "Unicut." Chemical analysis, heat-treatment, and applications are given. 30

Special Alloy Steel

JONES & LAUGHLIN STEEL CORPORATION, Pittsburgh 30, Pa. Bulletin describing a new special alloy steel known as "Jalloy" which is especially adapted for applications requiring maximum abrasion and impact resistance. 31

Carbide Dies

LINCOLN PARK INDUSTRIES, INC., Lincoln Park 25, Mich. Bulletin containing six case studies showing how carbide dies have increased production, reduced costs, and improved quality. 32

Hydraulic Valves

R - S PRODUCTS CORPORATION, 4530 Germantown Ave., Philadel-

phia 44, Pa. Catalogue 18, introducing a new line of 50-pound valves designed particularly for rugged hydraulic service. 33

Thread Milling Cutters

PRATT & WHITNEY DIVISION NILES-BEMENT-POND CO., West Hartford 1, Conn. Circular containing specifications on thread milling cutters for Pratt & Whitney thread milling machines. 34

Small Power Press Brakes

VERSON ALLSTEEL PRESS CO., 9309 S. Kenwood Ave., Chicago 19, Ill. Bulletin 16-48A, describing a new small-sized, low-cost power press brake designed to replace hand press brakes. 35

Power Shears

NIAGARA MACHINE & TOOL WORKS, 637-697 Northland Ave., Buffalo 11, N. Y. Bulletin 71-I, descriptive of the new Niagara line of high-speed power shears for light sheet metal. 36

Worm-Gear Speed Reducers

D. O. JAMES GEAR MFG. CO., 1126 W. Monroe St., Chicago 7, Ill. Catalogue 40-S, containing engineering data on single and double worm-gear reducers, including prices. 37

Blast Cleaning and Finishing

AMERICAN WHEELABRATOR & EQUIPMENT CORPORATION, 555 S. Byrkit St., Mishawaka, Ind. Bulletin 69, entitled "Copper Shot for Blast Cleaning and Finishing Non-Ferrous Metal Parts." 38

Spring Tester

BALDWIN LOCOMOTIVE WORKS, Testing Equipment Department, Philadelphia 42, Pa. Bulletin 302, illustrating and describing the Baldwin-Hunter spring tester and its applications. 39

Roll-Turning Lathes

MONARCH MACHINE TOOL CO., Sidney, Ohio. Booklet illustrating and describing a newly developed templet-controlled lathe designed for the contour-turning of steel mill rolls. 40

Wheels for Rotary Sanders

RAYBESTOS - MANHATTAN, INC., Manhattan Rubber Division, Passaic, N. J. Bulletin 6901-A, describing the Manhattan "Moldisc," a new bonded disk wheel for rotary sanders. 41

Form-Ground Tools

J & S TOOL CO., INC., 477 Main St., East Orange, N. J. Folder illustrating and describing the special form-ground tools produced by the company to customer specifications. 42

Circular Dividing Machine

GAERTNER SCIENTIFIC CORPORATION, 1201 Wrightwood Ave., Chicago 14, Ill. Bulletin 182-49, descriptive of an automatic machine for the production ruling of precision circular scales. 43

Rust Preventives

E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa. Booklet entitled "A New All-Star Line-Up of Rust Preventives," describing eleven "Rust Veto" products and listing their uses. 44

Taps

THREADWELL TAP & DIE CO., Greenfield, Mass. Circular containing new net price list covering the company's standard line of taps. 45

Abrasive Grinding Disks

BEHR - MANNING, Troy, N. Y. Circular describing the characteristics of the "Speed-Wet Metalite" fiber disks for grinding operations. 46

Rebuilt Machine Tools

MILES MACHINERY CO., Saginaw, Mich. Catalogue containing a classified list of the rebuilt machine tools available through this company. 47

Gears

PERKINS MACHINE & GEAR CO., West Springfield, Mass. Bulletin showing typical examples of Perkins metallic and non-metallic custom-cut gears. 48

Collet Chucks

SUTTON TOOL CO., Sturgis, Mich. Booklet illustrating and describing the features of the Porst line of "Levermatic" and "Handimatic" collet chucks. 49

Chromium-Plated Gages

CRO-PLATE CO., INC., 3343-47 Main St., Hartford 5, Conn. Circular listing new reduced prices of chromium-plated gages. 50

To Obtain Copies of New Trade Literature

listed in this section (without charge or obligation), fill in below the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail within three months of the date of this issue (December, 1949) to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

NAME.....POSITION OR TITLE.....

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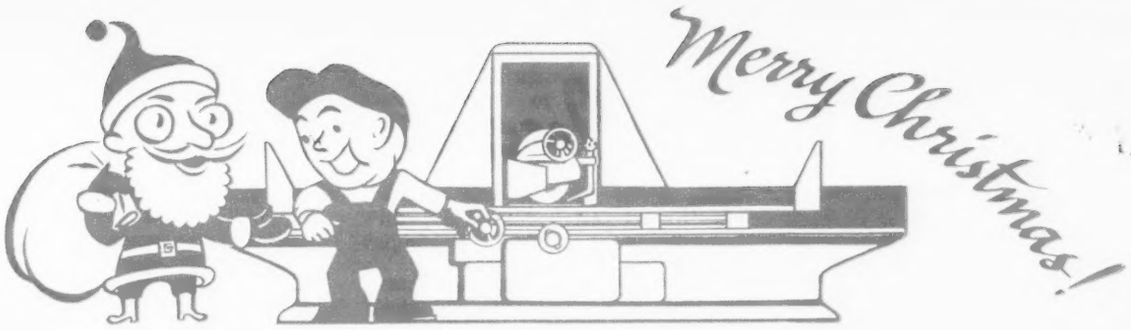


BETWEEN GRINDS

The Chap's Whiskers

When our staff artist was commissioned to sketch whiskers on one of the chaps standing at the grinder in our heading, he probably felt that it was an extra-curricular type of assignment. We just had to dress up said chap to resemble Santa, anemically so, the better to wish all of our readers a very Merry Christmas. If we had our way, a two-candle birthday cake would have been plummeted in his outstretched hand because with this issue *Between Grinds* has turned its second year. (Tonsorial memo: Be sure to shave whiskers next month.)

Would an Assemble-Your-Own Copy Do?

Half way in the process of editing the Fourteenth Edition of our HANDBOOK, an order was received from a book shop in Enid, Okla., as follows: "Rush when published or before, one copy, Fourteenth Edition, MACHINERY'S HANDBOOK. This is to be a birthday gift."

You Can't Tell a House by Its Facade

Back cover of the November issue of *Westinghouse Engineer* presents the front and rear of a Cape Cod cottage. The front shows a neat, landscaped cottage, but from the back, one sees, surprisingly, only the shell of a house. It actually contains a complete unit substation consisting of metal-clad switchgear and a 2500-KVA transformer. The camouflage arose because the conventional type of substation would not have been suitable in the residential community. As it is, a neighbor who goes a-borrowing stands to get an electric shock rather than a cup of sugar. H-m-m.

Explosively Yours

We scarcely dared open the envelope of a letter coming from the Zero Hour Bomb Co. It wasn't as lethal as we had visualized, since it merely contained a request for information of the sort we peaceably supply our readers. What really shattered us, though, was the last name of the man who signed the letter "Glass."

Bearing with History

"When young Henry and William Timken had finally assembled a complete bearing-equipped axle on a wagon, they filled it to overflowing and bought two small mules to pull the load to the railroad station four miles away. Almost immediately William was called to the phone by the driver, who said that he had been arrested and charged with cruelty to animals. William hurried to the police station, showed the magistrate one of the new roller bearings, and convinced him that the little mules could actually handle the big wagon because it was equipped with the new bearings. The case was dismissed and the publicity which it aroused was the first public notice of the new anti-friction device. A patent was issued on the new bearing in 1898."—*Public Opinion*

Hold Out Paint Brush when Making Right Turn

Our attention was held by an item about paint going around corners now in use on automobile parts. If you must know, a battery of electric eyes controls the paint spray gun which moves up, down, and sideways.

The Case of the Metal Petal

"An Orchid to Mr. Jordan" is a new Technicolor picture released by the United States Steel Corporation. Mr. Jordan, a design engineer played by Actor Otto Kruger, is presented with a stainless-steel orchid. He, a suave character, knows enough about ladies not to bring home to his wife this scratching if lasting corsage; rather he turns to a friend and explains the qualities of this wonder metal. The modern uses of stainless steel are then illustrated in a series of flash-backs.

No Passes—Forward and Free

A reference to us as the "Between Grids" editor caused us to ponder. Our duties, regretfully, do not include covering football games.

News of the Industry

California and Washington

B. A. BANNAN has been appointed general manager of the Western Gear Works, Seattle, Wash., and of all affiliated plants, including the Lynwood, Calif., and Seattle, Wash., plants of the company, the Pacific Gear & Tool Works in San Francisco, Calif., and the South Western Gear Works in Houston, Tex. He will make his headquarters at the Lynwood plant. B. J. BANNAN becomes assistant to the new general manager.

G. A. GRAY CO., Cincinnati, Ohio, builder of planers, planer type milling machines, and horizontal boring machines, has appointed the C. F. BULOTTI MACHINERY CO., 475 Fourth St., San Francisco 7, Calif., distributor for the company's entire line of machine tools in northern California.

AMERICAN DRILL BUSHING CO., INC., has recently opened a new manufacturing plant and headquarters offices at 5107 Pacific Blvd., Los Angeles 11, Calif. The plant provides ample space for the installation of new equipment and increased production facilities.

UNION TWIST DRILL CO., BUTTERFIELD DIVISION, Derby Line, Vt., announces the appointment of F. P. ROGERS, 520 First Ave., South, Seattle, Wash., as representative for its line of taps, dies, reamers, and other cutting tools in the states of Oregon and Washington.

Illinois, Indiana, and Missouri

FRANK WILLMOTT, Chicago district sales manager of the E. W. Bliss Co., Toledo, Ohio, retired on October 1 after twenty-four years of service with the company, and is succeeded by BERNARD E. MEYER. Mr. Meyer has been associated with the company since 1925, having previously served as sales engineer covering the Chicago district. For four months prior to his present appointment, he has been on a special assignment in the general sales organization of the company at Toledo.

L. R. KERNS CO., Chicago, Ill., manufacturer of industrial lubricants announces that L. R. KERNS is no longer associated with the company, his interest having been purchased by a group of employes. All the present representatives and employes have been retained. The new officers are president, B. L. SMALLEY, and vice-presidents, S. F. GORDON and D. E. FREDERICKS.

EUGENE C. O'CONNELL, formerly service engineer with the Los Angeles branch of the Independent Pneumatic Tool Co., Aurora, Ill., manufacturer of Thor portable power tools, has been appointed manager of the sales and service branch of the company at San Francisco. CLARENCE H. GABRIEL, previously service engineer at the Salt Lake City branch, has been made manager at Denver, Colo.

EUGENE P. BERG, formerly general superintendent of the Link-Belt Co., Chicago, Ill., has been appointed to the newly created position of assistant general manager of the Pershing Road Plant. RICHARD MOYER, previously superintendent of the steel shop, has been made general superintendent.

HYDRO-LINE MFG. CO., Rockford, Ill., has appointed the following representatives for the company's line of air and hydraulic cylinders and special machinery: AUSTIN-HASTINGS CO., INC., 226 Binney St., Cambridge, Mass.; and HYDRO PNEUMATICS, INC., 95 Liberty St., New York, N. Y.

LAPOINTE MACHINE TOOL CO., Hudson, Mass., announces the opening of new and larger offices at 2400 W. Madison St., Chicago, Ill. JAMES W. DOPP, GEORGE A. HODGES, JR., and RICHARD S. DAVIS will serve as sales and service engineers, with headquarters at the new offices.

UNION TWIST DRILL CO., BUTTERFIELD DIVISION, Derby Line, Vt., manufacturer of taps, dies, reamers, and special metal-cutting tools, has appointed SMINKEY & HAAS, 2421 W. Pratt Ave., Chicago, Ill., distributor for the company's products.

SYNTHANE CORPORATION, Oaks, Pa., manufacturer of laminated phenolic plastics, announces the removal of its Chicago sales offices from 40 S. Clinton St. to larger quarters at Morton Grove, Ill., near Chicago.

READY TOOL CO., Bridgeport, Conn., announces the appointment of RAYMOND C. STOELTING, 4801 Wentworth Blvd., Indianapolis, Ind., as representative for the Red-E line of ball-bearing centers; carbide, high-speed, and carbon steel solid centers; forged-steel dogs; tool-holders; etc.

J. H. GOODSPEED, formerly in the Chicago sales office of the Titan Metal Mfg. Co., Bellefonte, Pa., has been placed in charge of the company's sales office in St. Louis 1, Mo.

Michigan

JOHN W. JESSEN, 417 East C St., Iron Mountain, Mich., has been appointed representative for the line of drill jig bushings, steel stamps, and marking devices produced by COLONIAL BUSHINGS, INC., Box 37, Harper Station, Detroit 13, Mich., and NEW METHOD STEEL STAMPS, INC., 147 Joseph Campau, Detroit 7, Mich.

CONE-DRIVE GEARS, DIVISION OF MICHIGAN TOOL CO., Detroit, Mich., announces the purchase of the plant of the Parsons Corporation, located at Twelfth St. in Traverse City, Mich. This plant contains approximately 40,000 square feet.

JOSEPH GANGLER has been appointed sales and engineering representative in the Detroit territory for the Snyder Tool & Engineering Co., Detroit, Mich., builder of special machinery. Prior to this appointment, Mr. Gangler was in the engineering department of the Chrysler Corporation for twenty-three years and in the sales and engineering department of The Cross Company for five years.

Joseph Gangler, newly appointed sales and engineering representative of the Snyder Tool & Engineering Co.

New England

L. S. STARRETT CO., Athol, Mass., manufacturer of mechanics' hand measuring tools, precision instruments, saws, knives, etc., has recently completed an expansion plant program for the company's hacksaw, band saw, band knife, and precision-ground flat stock division. The new plant, which is now in full production, is planned with a view to straight-line production and continuous flow of material from the raw steel to the finished product. Close metallurgical control of all steel used in the products is maintained by a newly equipped metallurgical laboratory. The new building is 114 feet wide by 408 feet long.

ELDEN L. AUKER has been appointed assistant district manager in the Michigan area for the Bay State Abrasive Products Co., Westboro, Mass. He has been employed by the company since January, 1948, as an abrasive engineer, and prior to that was Detroit district manager for the Mid-West Abrasive Co.

TECNIFAX CORPORATION, Holyoke, Mass., has recently been organized to manufacture ammonia-developing diazotype reproduction materials for Ozalid and similar printing machines.

WHITON MACHINE CO., New London, Conn., manufacturers of lathe chucks and centering machines, announces the appointment of the following agents: ANDERSON & WHITE SUPPLY CO., 2910 W. Armitage St., Chicago, Ill.; STANDARD EQUIPMENT & SUPPLY CO., 534 Michigan Ave., Hammond, Ind.; VALLEY SUPPLY & TOOL CO., Aurora, Ill.; and BANSBACH MACHINERY CO., Chicago, Ill.

CURTIS D. CUMMINGS has been made sales manager of the Allison Co., Bridgeport, Conn., manufacturer of abrasive cutting wheels. Prior to his present connection, Mr. Cummings had been associated for twelve years with S K F Industries, Inc., Philadelphia, Pa.

WILLIAMS & HUSSEY MACHINE CO., Wilton, N. H., manufacturer of Star gages and special machinery, has acquired the assets of the O. K. TOOL CO., Shelton, Conn., manufacturer of single-point and inserted-blade type milling cutters. The O. K. Tool sales staff and executive personnel will remain unchanged, and the O. K. Tool Co. will operate as a division of the parent company.

New York and New Jersey

LELAND T. WELLER, Carboloy specialist for the apparatus department of the General Electric Co., Schenectady, N. Y., retired recently after more than twenty-five years of service with the company.

HARRY C. PLATT has been appointed vice-president of the Engineered Castings Division of the American Brake Shoe Co., 230 Park Ave., New York 17, N. Y., and WILLIAM H. STARBUCK has been made vice-president of the Kellogg Division. Mr. Platt was formerly works manager, and Mr. Starbuck assistant general sales manager. Also announced is the appointment of WILLIAM C. BRUTON as district sales manager for the American Manganese Steel Division, and ROBERT H. ELEM as Pacific Coast manager of the Welding Products Department. Mr. Bruton's headquarters will be at Oakland, Calif., and Mr. Elem will be located at Los Angeles, Calif.

(Left) Harry C. Platt, recently appointed vice-president of Engineered Castings Division of the American Brake Shoe Co. (Right) William H. Starbuck, new vice-president of the Kellogg Division of the company

Fred H. Haggerson, who was recently awarded the Medal for the Advancement of Research by the American Society for Metals

FRED H. HAGGERSON, president of the Union Carbide & Carbon Corporation, 30 E. 42nd St., New York 17, N. Y., was presented with the 1949 Medal for the Advancement of Research by the American Society for Metals, at the annual banquet of the Society, recently held in Cleveland. Mr. Haggerson was cited as an outstanding example of an industrial leader who has advanced technological progress in broad fields of the metal industries to the ultimate benefit of the consuming public.

AMERICAN MANGANESE STEEL DIVISION OF AMERICAN BRAKE SHOE CO., 230 Park Ave., New York 17, N. Y., announces the appointment of the WHITEHEAD METAL PRODUCTS CO., INC., as distributor of the complete line of Amsco welding products, including rods and electrodes for hardfacing and repair work. The Whitehead company operates warehouses in the major cities of five eastern states, including New York, New Jersey, Pennsylvania, Massachusetts, and Maryland.

TINNERMAN PRODUCTS, INC., Cleveland, Ohio, manufacturer of "Speed" nuts, clips and clamps, has established a western New York sales division at Rochester, N. Y., with headquarters in the Cutler Bldg. The sales manager of the new district will be CHRIS RINGHAVER, who has been connected for three years with the Cincinnati office of the company.

H. R. SALISBURY has been appointed president of the Air Reduction Sales Co., New York 17, N. Y. He has been connected with the organization for over twenty-three years in various

executive capacities. New vice-presidents appointed are H. F. Henriques (general sales); J. J. Lincoln, Jr., (railroad sales and sales services); S. B. Stouffer (distribution); N. L. Wisser (field office management).

Hauser Machine Tool Corporation, 30 Park Ave., Manhasset, L. I., N. Y., has been appointed exclusive United States factory representative for S. Lambert, S. A., Solothurn (Soleure) Switzerland, manufacturer of precision gear generating and hobbing machines, wheel cutting machines, and plate facing and recessing machines.

Porter-Cable Machine Co., Syracuse, N. Y., manufacturer of portable electric tools, has purchased the manufacturing rights and facilities of the Sterling Electric Tool Products Co., Chicago, Ill., for the production of Sterling portable electric and pneumatic sanders. The business will be moved to Syracuse.

Earl T. Gruendike, general superintendent of the General Railway Signal Co., Rochester, N. Y., has been promoted to the position of works manager. Charles J. Gendreau, formerly assistant factory superintendent, becomes general superintendent.

John A. Proven has been named vice-president in charge of sales for the Porter-Cable Machine Co., Syracuse, N. Y. For the last year, he has been general sales manager.

De Laval Steam Turbine Co., Trenton 2, N. J., has opened a district office in Tulsa, Okla., with Harold Meyer in charge as manager. The company also announces the appointmet of the Lefler Wymont Supply Co., Casper, Wyo., and the Roger Brown Co., El Paso, Tex., as representatives for the company.

Ohio

J. C. Stites has been appointed assistant manager of sales and export sales manager for the Cleveland Twist Drill Co., Cleveland, Ohio. Mr. Stites, who has been with the company for twelve years, was advanced to his present position from the Field Sales Division. He is taking the place left vacant by the death of H. P. Jenson. R. O. Artner, formerly manager of the Detroit stockroom of the company, has been promoted to the Field Sales Division.

Warner & Swasey Co., Cleveland, Ohio, announces the appointment of the following representatives: Hallidie Machinery Co., 1020 S.W. Taylor St., Portland, Oreg.; and Harron, Rickard & McCone Co., San Francisco, Calif.

Walter J. Herbut has been promoted to the post of chief tool designer of the Auto-Diesel Piston Ring Co., 3145 Superior Ave., Cleveland, Ohio. Mr. Herbut has been with the company for fifteen years.

George R. Lundberg has been appointed director of advertising and sales promotion for the Osborn Mfg. Co., Cleveland, Ohio, manufacturer of industrial brushes and foundry molding machines.

G. K. Eggleston has been appointed vice-president in charge of manufacturing of Non-Ferrous Perma Mold, Inc., Mansfield, Ohio, and S. E. Gregory has been made general sales manager.

Glenn H. Edgecomb, formerly works manager of the Holtzer-Cabot Electric Co., Boston, Mass., has become works manager of Jack & Heintz Precision Industries, Inc., Cleveland 1, Ohio.

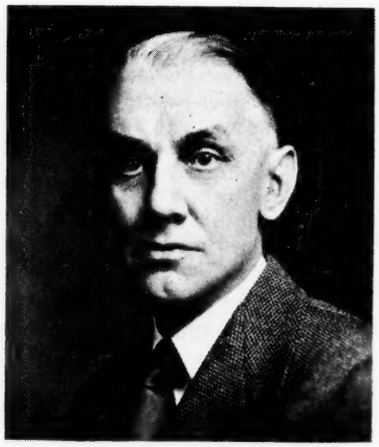
Pennsylvania

Simonds Abrasive Co., Philadelphia, Pa., manufacturer of grinding wheels and abrasive grain, has appointed F. R. Wilkes sales engineer for the company in the Chicago area, and K. R. Bartholomew sales engineer in the eastern Pennsylvania and northern New Jersey territory.

T. W. Gabriel has been appointed general sales manager of the Firth Sterling Steel & Carbide Corporation, McKeesport, Pa. Mr. Gabriel has been sales manager of the Ohio district since August, 1944, when he left the Carnegie-Illinois Steel Corporation to join Firth Sterling. Other appointments announced by the company are: Macon Jordan, district sales manager of the Ohio district; and R. C. Wilkison, carbide supervisor of the Detroit district.

Photo Trout-Ware

T. W. Gabriel, newly appointed general sales manager of Firth Sterling Steel & Carbide Corpn.



Samuel F. Newman, who recently celebrated the completion of fifty years with the machine tool industry

Samuel F. Newman, chairman of the board of directors of the Landis Tool Co., Waynesboro, Pa., recently completed fifty years of continuous service in the machine tool industry. In commemoration of the occasion, Mr. Newman was tendered a dinner by the board of directors and officers of the company. It was on November 1, 1899, that Mr. Newman started to work with the company, which was then only two years old. After serving a machinist apprenticeship in the Landis plant, he became connected with the W. H. Foster Co. of Boston in July, 1903, but returned in May, 1904, to work with the Landis Tool Co. In January, 1908, he accepted employment with the Landis Machine Co., and was connected with that company for thirty-two years, working his way up from draftsman to vice-president. In 1940, he rejoined the Landis Tool Co. as president, and in 1948 became chairman of the board, which position he still holds. During this fifty-year period, Mr. Newman helped to develop many of the major advances in thread cutting and grinding practices.

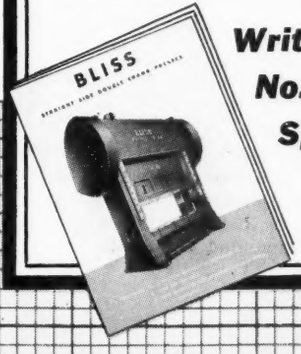
Robert W. Wolcott, president of the Lukens Steel Co., Coatesville, Pa., since 1925, has been named chairman of the board, and Charles Lukens Huston, Jr., vice-president and executive assistant to the president since 1948, has been elected president.

American Machine & Foundry Co., 511 Fifth Ave., New York 17, N. Y., announces the purchase of all properties and assets of DeWalt, Inc.,

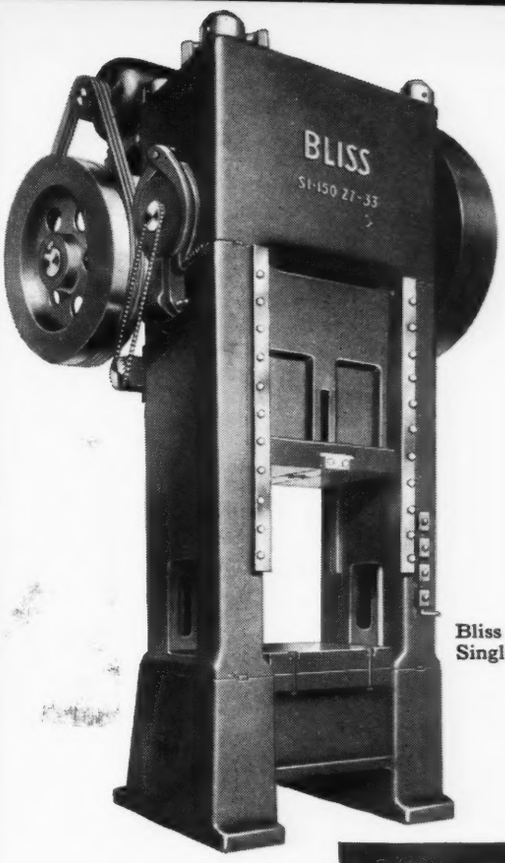
All these design features are now standard equipment in Bliss Straight Side Presses

1. **PRESS FRAMES** are of the four-piece tie-rod construction, made of high grade Meehanite castings.*
   a) **CROWNS** are a rigid box structure of deep cross section, heavily reinforced with internal ribs front to back.
   b) **UPRIGHTS** are built to withstand lateral stresses caused by uneven loading of the slide.
   c) **BEDS** are proportioned to handle any distribution of the work load up to the full capacity of the crankshaft. All beds are machined to receive Bliss-Marquette die cushions for forming and drawing work.
   **Presses of steel weldment construction are built in the larger sizes.*
2. **EXTRA LONG SLIDES AND GIBS FOR PRECISION GUIDING OF DIE.** Slide is always in the gibs at any point of the stroke or adjustment.
3. **MOTOR DRIVEN BARREL TYPE SLIDE ADJUSTMENT.** (A former special feature, now standard equipment.) Self-locking worm drive permits long adjustment, eliminating the need for ring risers and stools when die height varies greatly. Insures accurate alignment and longer die life.
4. **SLIDE IS AIR COUNTERBALANCED,** with cylinders suspended from the top of the crown, permitting easy accessibility.
5. **BLISS ROLLING KEY CLUTCH** is furnished on all geared presses up to 125 tons capacity.
6. **BLISS PNEUMATIC FRICTION CLUTCH** is supplied on all other straight side presses, both non-geared and geared types. Air strainers are used to keep moist air out of the clutch.
7. **SINGLE CRANK PRESSES WITH SINGLE END DRIVE,** from 150 tons to 250 tons capacity, have the Bliss Pneumatic Friction Clutch mounted on the crankshaft. Gears and drive parts rotate continuously. The only load on clutch and brake is that required to start and stop the counterbalanced slide and crankshaft.
8. **PRESS PARTS ARE MADE** on a well developed program of standards with interchangeability among different types and sizes.
9. **CRANKSHAFTS ARE HAMMER FORGED** of 1045 SAE steel. Crankpins are oversize.
10. **STANDARD LUBRICATION** is floor line grease system to the gibbing and main bearings.

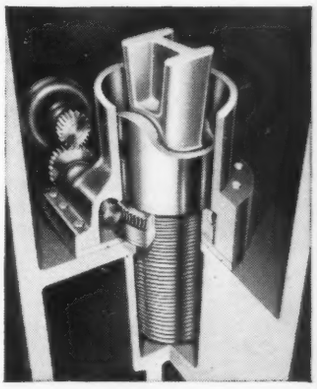
Oil tight gear guards, crossbar knockout, outside trimming slide, automatic feeds, die cushions and other auxiliary devices can be furnished for these presses, as well as additional electrically controlled operating or foot button stations suited to your individual production needs.



Write for Bulletin No. 17-B for Complete Specifications

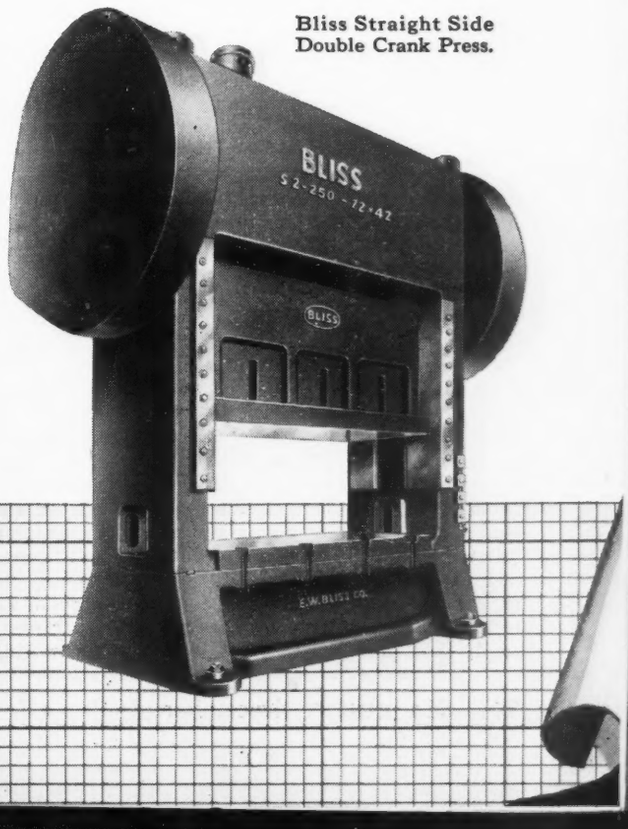


Bliss Straight Side Single Crank Press.



Long adjustment is provided by two barrel type connections.

Bliss Straight Side Double Crank Press.



Lancaster, Pa., manufacturer of radial saws for cutting light metals, wood, and plastics. The American Machine & Foundry Co. will continue the operation of the DeWalt plant at its present location.

CARL B. POST and GEORGE V. LUERSSEN of the Carpenter Steel Co., Reading, Pa., were honored at the annual meeting of the Pittsburgh Section of the American Institute of Mining and Metallurgical Engineers for outstanding contribution to the steel industry. The men were awarded a Certificate of Merit for their work in developing a new method of melting better steel, which was described in a paper presented before the Institute.

THOMAS A. DALY has been appointed engineering manager in charge of all Naval Ordnance work of the Westinghouse Electric Corporation at Sharon, Pa.

HARRY J. DEINES has been named manager of advertising and sales promotion for the Westinghouse Electric Corporation, Pittsburgh, Pa.

* * *

Westinghouse Organizes School for Supervisors

A management school has been set up at the various plants of the Westinghouse Electric Corporation to give supervisors an opportunity to study the latest principles of successful management.

Organized by the corporation's Management Development Service, this "school for bosses" has three primary objectives: (1) To assure that Westinghouse management—from foreman to manager—has the latest knowledge and the best training possible for efficiently running today's complicated industrial operations; (2) to build the finest spirit of teamwork possible among the management personnel; and (3) to develop high quality supervisors from within the ranks of the employes. Under the program, the manager of each Westinghouse plant selects the supervisors who will "go to school."

* * *

Automotive manufacturers have long noted that when the economic outlook is good, more people want light colors on cars. One firm reports that black — usually the big color leader—now accounts for but 20 per cent of sales. Green shades lead with 25 per cent. Gray and blue follow. Maroon — formerly second — now has dropped in popularity. Safety experts have approved the shift to light colors, as it makes cars more easily seen at night.

Obituaries

A. J. Jennings

A. J. Jennings, vice-president in charge of sales of the Cleveland Worm & Gear Co., Cleveland, Ohio, and its associate company, the Farval Corporation, died suddenly on October 30, following a heart attack, at the age of fifty-four years.

Mr. Jennings was born in Adrian, Mich., and began his business career with the E. F. Houghton Co. of Philadelphia. After being connected with this company for fourteen years, he left to become vice-president and general manager of Lubrication Devices, Inc., Battle Creek, Mich., predecessor to the Farval Corporation, and a pioneer manufacturer of centralized systems of industrial lubrication. He went to Cleveland in 1932 when the Farval Corporation was purchased by the Cleveland Worm & Gear Co.

As one of the most active figures in the American Society of Lubrication Engineers, Mr. Jennings served on various committees and delivered many papers before the national meetings of the Society. He was also active in the American Gear Manufacturers Association, serving at the time of his death as chairman of the General Commercial Committee. He is survived by his wife, a daughter, and two sons.

Charles E. Carpenter

Charles Edgerton Carpenter, who has been associated with the machine tool industry for the last forty years, died suddenly on October 21 at his home in Stamford, Conn. Mr. Carpenter was born in Lewes, Del. After graduating from Erlangen University in Germany, he became representative of the Yale & Towne Mfg. Co. abroad, and later represented many machine tool concerns in all parts of the world.

Mr. Carpenter reorganized the Allied Machinery Co. of America, and was first vice-president and general manager of that company. At one time, he was connected with the Standard Tool Co. of Cleveland, in charge of that company's export business. In July 1940, he was appointed technical advisor to the Machine Tool Division of the Washington and New York offices of the British Purchasing Commission. From April 1, 1945, until his death, he represented A.-B. Lunden & Bonthron of Stockholm, Sweden.

During World War I Mr. Carpenter served as Aide to General Dawes, and was awarded the Legion of Honor Medal, and in World War II he was awarded the King's Medal.

Charles S. Traer

Charles S. Traer, chairman of the board of the Acme Steel Co., Chicago, Ill., died suddenly on October 25 of a heart attack. Mr. Traer had just completed thirty years of service with the company, having started his career as works manager in 1919. He subsequently served as treasurer, vice-president and manager of production, president, and chairman of the board.

Mr. Traer was born in Chicago on November 24, 1890, and was educated in the Harvard School for Boys at Chicago. Later, he attended Yale University, from which he graduated in 1910 with a Bachelor of Philosophy degree. During the first World War, he served as a Captain in the U. S. Army. His widow and two daughters survive him.

* * *

Motion Picture on Forming and Welding of Steel Tubing

The Etna Machine Co., Toledo, Ohio, has produced a motion picture on the forming and welding of steel tubing. The film is available, without charge, for showing to companies and professional societies. It has also been announced that the company has in preparation films on rotary swaging machines and stationary tube cut-off machines, which will soon be released. Further information can be obtained directly from the company at the address given above.

* * *

A new mill for the production of electric welded steel pipe is being constructed at the National Works of the National Tube Co., McKeesport, Pa. The new facilities will provide for an annual capacity of 100,000 tons of 26-inch and larger welded and expanded steel pipe.

Improved solderless lug of hard drawn Revere Copper, cold worked over and over without distortion, cracking, pitting or scarring.

Pierced, formed at short 45 degree and 90 degree angles and deeply serrated, this "Double G" solderless lug really gets a working over . . . and cold, too, no annealing. Yet, with all this, the surface remains absolutely smooth, the lug is not in any way weakened and there is no twisting, pitting, cracking or scarring of any kind. And, in addition, its dimensions are held.

When the Gregory Manufacturing Co., Inc., was developing this solderless lug, with its unusual features, it had a problem on its hands.

Their design called for copper strip that could stand a lot of cold working and when finally fabricated into a product of uniform quality, would not have a lot of twist, cracks, pitted or scarred surface. In their efforts to secure such a product their engineers had frequent consultations with Revere's Technical Advisory Service. The result was the product shown and described above, with production time and money saved and rejects held to the vanishing point. The material used was Revere hard drawn copper strip with a temper of 36 to 46 Rockwell B Scale. This company feels that they could not have developed such a successful product if the quality of the copper was not of the best and did not possess the inherent working characteristics needed.

Perhaps Revere Copper or some other Revere Metal can be of help in developing or improving your product—cutting your production costs. Why not tell Revere's Technical Advisory Service about your metal problems? Call the Revere Sales Office nearest you today.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

New Books and Publications

A.S.M.E. Mechanical Catalog and Directory (1950). 690 pages, 8 1/2 by 11 1/4 inches. Published by the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

This is the thirty-ninth volume of a collective catalogue and directory of industrial equipment and supplies, covering eleven main groups of industry. The principal section of the book contains catalogue data of the various manufacturers in these industries, arranged alphabetically according to the names of the manufacturers. In this section are described hundreds of items used by industry in manufacturing its products and maintaining its plants. The directory contains an alphabetical list of mechanical equipment, machinery, and materials, together with the names and addresses of the manufacturers, classified by products. There are 6500 classifications in this section, and 4600 manufacturers are represented. Following this section is an alphabetical list of trade names, including the names and addresses of the manufacturers. The trade name index covers only the products shown in the catalogue section of the book.

Stainless Steels. By Carl A. Zapffe. 368 pages, 6 by 9 inches. Published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Price, $5.

Designers and engineers concerned with the selection of materials will welcome this comprehensive reference work on the stainless-steel group of alloys which occupy such an important place in industry today. The book is written in a simple style to serve as an elementary text for the consumer, the purpose being to give users and potential users a good idea of the field and possible applications of these steels. It gives detailed information on the chemical and metallurgical nature of stainless steels, as well as the physical and mechanical properties, and includes general instructions for fabricating. While the book is written in as simple a manner as the subject permits, essential technical principles are covered. Such technical aspects as constitutional diagrams, thermodynamics, etc., are not treated, although references are given to sources where such data can be found. The discussion is confined primarily to wrought alloys and to the property of corrosion resistance, no attempt being made to include cast alloys and those formulated for heat and oxidation resistance.

The subject is discussed under seven different headings as follows: Historical Background of the Stainless Steels; The Corrosion Resistance of the Stainless Steels; The Metallurgical Constitution of the Stainless Steels; Class I—Martensitic Stainless Steels; Class II—Ferritic Stainless Steels; Class III—Austenitic Stainless Steels; Production, Fabrication and Finishing.

Weld Design. By Harry D. Churchill and John B. Austin. 216 pages, 5 3/4 by 8 1/2 inches. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. Price, $6.65.

This book is intended to supply the need for a concise volume on welded machine-base design. In the past, little information has been available in text-books on the welded type of base. This is due to the fact that electric arc welding is a production tool that has only been developed in recent years to the point where it has been generally recognized by the machine designer. Today the fabricating of machine bases by arc-welding is being applied to many different types of designs.

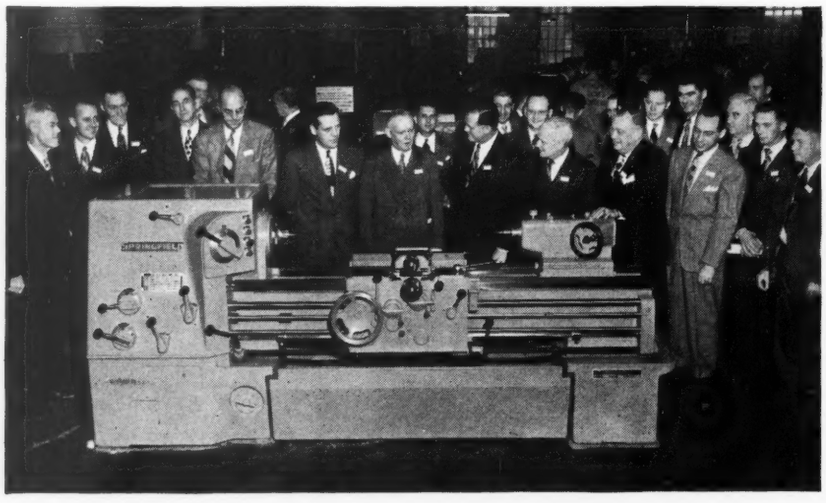
An idea of the treatment of the subject matter will be obtained from the following list of chapter headings: Construction Materials of Machine Bases; Stress Analysis and Design Data; Designing Arc-Welded Machine Bases; Application of Welded-Design Principles; Welding Specifications; Weldery Procedure; Welding Processes; Flame-Cutting and Flame-Hardening; Forming of Metals; and Estimating Welded Machine-Base Costs.

Technical Sketching and Visualization for Engineers. By Hyman H. Katz. 163 pages, 7 1/2 by 10 inches. Published by the Macmillan Co., 60 Fifth Ave., New York 11, N. Y. Price, $5.

In this book, the author demonstrates in detail the techniques by which anyone can become adept in the various types of engineering drawing. The initial chapters describe the different kinds of sketches and show the requirements and purposes of each. Following is a step-by-step instruction in drawing, beginning with the free-hand drawing of lines and curves and continuing through proportion, lettering, orthographic and pictorial sketching, and shading. Chapters on measurements and on cut-outs, models, and other non-graphic methods of visualization are included. The book is illustrated with several hundred illustrative sketches.

Analytical Mechanics of Gears. By Earle Buckingham. 546 pages, 6 by 9 inches. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price, $10.

The purpose of this book is to give as complete an outline as possible of the fundamental relationships that form the foundation of the design of



On November 3, the Springfield Machine Tool Co., Springfield, Ohio, held an interesting exhibit of newly developed equipment at its plant, to which were invited the company's dealers and sales representatives, as well as members of the technical press. The illustration shows some of these men gathered around the new Springfield 16-inch lathe, described on page 199 of this number of MACHINERY. Other machines shown included a 20-inch contour lathe, an 18-inch form-turning lathe, and a vertical universal grinding machine

Automatic Grinding OF LARGE CASTINGS in 1/7th OF THE TIME!

NEW No. 936 Vertical Spindle BESLY Rotary Surface Grinder

Per-piece grinding time cut from 96 to 13 minutes, a 7-fold improvement — Automatic operation for savings on costly expert labor — Modern design to cut maintenance — A minimum of pre-setting!

These are the spotlighted results achieved by this new Besly grinder, now used by a Texas company in grinding gates for high pressure oil lines. Tests show this grinder equally efficient on fifth wheel castings, small gas engine bases, fluid drive transmission housings and many other types of work.

Here again, Besly experience in grinder design, engineering and manufacture has served to produce *improved* grinding in less time and at *lower* cost. Beating high costs today on production grinding means modern grinding equipment, built by experts to meet your specific needs.

When you call on Besly you get the benefit of more than 50 years accumulated experience — the kind of help that means more production profit at lower cost on grinding.

CHECK THESE PRODUCTION BOOSTING, MONEY-SAVING FEATURES OF THE No. 936

- **Vertical, Single Spindle** — using 42" diameter abrasive ring above a rotating table.
- **Entire Spindle Assembly** — raised or lowered by feed screw.
- **Quick, Easy Loading Table** — slotted for secure holding of work with bolts. Operates at any speed from 1 to 6¼ RPM.
- **Automatic Operation** — after table is loaded and controls adjusted.
- **Pendant Control Box** — within easy reach of operator.
- **Motors, Bearings, Cylinders** — all designed to operate at highest efficiency with minimum power and maintenance requirements.

TITAN WHEELS

Here's a valuable source of information on modern grinding wheels and abrasives with all the facts on Besly Titan Steelbacs to save "down time." Write for your copy today!

Maybe GRINDING is the Better Way... Better Check with BESLY

BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

CHARLES H. BESLY AND COMPANY • 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

all types of gears. It is not intended to be a text on the design of gears, but rather a source book for developing an effective design of gears for any purpose.

The text covers the whole field of uniform transmission of motion and power by means of gears. It deals with the nature of the action, the forms of the teeth, the influence and nature of friction, the conditions that affect the intensity of the dynamic loads, the strength of gear teeth, and the resistance to wear of various combinations of materials. All types of gears, including spur and helical gears on parallel shafts, bevel and spiral bevel gears on intersecting shafts, and spiral, worm, and hypoid gears on non-parallel and non-intersecting shafts are covered.

APPRENTICE TRAINING STANDARDS. Published by the National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6, Ohio. Price, $2.

This is a working manual for seting up and conducting an apprentice training course, originally published for the use of members of the National Machine Tool Builders' Association, but now available to industry in general. It specifies in detail the nature of the work to be done by the apprentice, and contains samples of the forms required, including the application for apprenticeship, the apprenticeship agreement, and the works records required. It also includes a bibliography on the subject of machine tool practice and apprentice training. This book is designed to help a company install a full apprenticeship course which turns out graduate apprentices with a well rounded background, and is not intended for use in connection with limited or short-term training courses.

PACKAGING, MARKING, AND LOADING METHODS FOR STEEL PRODUCTS FOR COMMERCIAL OVERSEAS SHIPMENTS. 165 pages, 6 by 9 inches. Published by the United States Department of Commerce, Washington, D. C., as Simplified Practice Recommendation R237-49. Obtainable from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price, 40 cents.

Coming Events

JANUARY 16-19, 1950—First Plant Maintenance Show in the Auditorium, Cleveland, Ohio. Further information can be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

FEBRUARY 27-MARCH 3, 1950—Spring meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS at the Hotel William Penn, Pittsburgh, Pa. Executive Secretary, C. L. Warwick, 1916 Race St., Philadelphia 3, Pa.

MARCH 28-31, 1950—FOURTH NATIONAL PLASTICS EXPOSITION at the Navy Pier, Chicago, Ill. Sponsored by the SOCIETY OF THE PLASTICS INDUSTRY. William T. Cruse, executive vice-president, 295 Madison Ave., New York 17, N. Y.

APRIL 4-8, 1950—NATIONAL PRODUCTION EXPOSITION at the Stevens Hotel, Chicago, Ill. Sponsored by the Chicago Technical Societies Council, Inc., Exhibit manager, John C. Toohy, 176 W. Adams St., Chicago 3, Ill.

APRIL 5-7, 1950—Twelfth annual MIDWEST POWER CONFERENCE at the Sherman Hotel, Chicago, Ill. Sponsored by the Illinois Institute of Technology, 3300 S. Federal St., Chicago 16, Ill.

APRIL 10-14, 1950—Exposition of the AMERICAN SOCIETY OF TOOL ENGINEERS at the Convention Hall and Commercial Museum in Philadelphia, Pa. Details available upon request to the Exposition headquarters of American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

JUNE 26-30, 1950—Annual meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS AND NINTH EXHIBIT OF TESTING APPARATUS at the Chalfonte-Haddon Hall, Atlantic City, N. J. Executive Secretary, C. L. Warwick, 1916 Race St., Philadelphia 3, Pa.

* * *

The parts list for a typical household sewing machine runs to about 185 items, most of them weighing an ounce or less.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946,

of MACHINERY, published monthly at New York 13, N. Y., for October 1, 1949.

State of New York } ss
County of New York }

Before me, a Notary Public in and for the state and county aforesaid, personally appeared Edgar A. Becker, who, having been duly sworn according to law, deposes and says that he is the treasurer of The Industrial Press, Publishers of MACHINERY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946, (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editors, managing editor, and business managers are: Publisher, The Industrial Press, 148 Lafayette Street, New York 13, N. Y.; Editor, Charles O. Herb; Consulting Editors, Erik Oberg and Franklin D. Jones; Business Managers, Robert B. Luchars, Edgar A. Becker, and Harold L. Gray. The address of all the foregoing is 148 Lafayette Street, New York 13, N. Y.

2. That the owners of 1 per cent or more of the total amount of stock are: The Industrial Press, Robert B. Luchars, Edgar A. Becker, Franklin D. Jones, Walter E. Robinson, Charles O. Herb, Harold L. Gray, Clifford Strock, and Suno E. Larson, all of 148 Lafayette Street, New York 13, N. Y.; Helena E. Oberg, 65 Eighty-second Street, Brooklyn 9, N. Y.; Wilbert A. Mitchell, 28 Harlow Road, Springfield, Vt.; First National Bank & Trust Co. of Montclair and Robert B. Luchars, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank & Trust Co. of Montclair and Leigh Roy Urban, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank & Trust Co. of Montclair and Kenneth D. Ketchum, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; Lee W. Urban, Guardian for Susan Yarnall Urban, 27 Clinton St., Oneonta, N. Y.; Lee W. Urban, Executrix of Will of Robert L. Urban, 27 Clinton St., Oneonta, N. Y.; and John T. Urban, 224 Sullivan St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders are: Charlotte B. Baldwin, 420 Clinton Ave., Brooklyn, N. Y.; Robert B. Luchars, John Connolly, Franklin D. Jones, and Louis Pelletier, all of 148 Lafayette St., New York 13, N. Y.; Elizabeth Y. Urban, 38 Lakeview Road, Asheville, N. C.; Helen L. Ketchum, 231 King St., Cohasset, Mass.; Wilbert A. Mitchell, 28 Harlow Road, Springfield, Vt.; and Henry V. Oberg, 3375 Kenmore Road, Shaker Heights 22, Ohio.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner: and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

EDGAR A. BECKER, Business Manager

Sworn to and subscribed before me this 30th day of September, 1949.

(SEAL)

CHARLES P. ABEL
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